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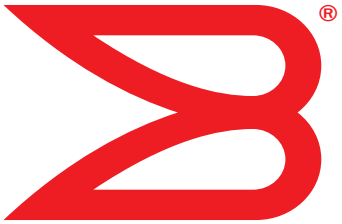
05 March 2012



Brocade FastIron SX Series Chassis

Hardware Installation Guide

Supporting Brocade FastIron R07.4.00

BROCADE

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Supported hardware and software

This guide describes the FastIron SX Series Chassis devices running software release 07.4.00.

The following hardware platforms are supported by this release of this guide:

- FastIron SX 800® (FSX 800)
- FastIron SX 1600® (FSX 1600)

NOTE
This document describes software release 07.4.00. Refer to earlier releases of this guide for information about software releases prior to 07.4.00.

Document conventions

This section describes text formatting conventions and important notice formats used in this document.

Text formatting

The following narrative-text formatting conventions are used in this guide.

bold text	Identifies command names
	Identifies the names of user-manipulated GUI elements
	Identifies keywords
	Identifies text to enter at the GUI or CLI
italic text	Provides emphasis
	Identifies variables
	Identifies document titles
`code` text	Identifies CLI output

For readability, command names in the narrative portions of this guide are presented in bold: for example, **show version**.

Command syntax conventions

The following conventions for command syntax are used in this guide.

command and parameters	Commands and parameters are printed in bold.
[ ]	Optional parameter.
variable	Variables are printed in italics enclosed in angled brackets < >.
...	Repeat the previous element, for example “member[;member...]”
|	Choose from one of the parameters.

Notes, cautions, and danger notices

The following notices and statements are used in this manual. They are listed below in order of increasing severity of potential hazards.

NOTE
A note provides a tip, guidance or advice, emphasizes important information, or provides a reference to related information.

CAUTION

A Caution statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.

DANGER

A Danger statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

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Corporation	Referenced Trademarks and Products
Microsoft Corporation	Internet Explorer
Mozilla Corporation	Mozilla Firefox
Sun Microsystems	Java Runtime Environment
Phillips Screw Company Inc.	Phillips

Related publications

The following Brocade Communications, Inc. documents supplement the information in this guide.

- *FastIron Configuration Guide*
- *Unified IP MIB Reference*

NOTE
For the latest edition of these documents, which contain the most up-to-date information, go to *http://www.brocade.com/ethernetproducts.*

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To contact Technical Support, go to *http://www.brocade.com/services-support/index.page* for the latest e-mail and telephone contact information.

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Provide the title and version number of the document and as much detail as possible about your comment, including the topic heading and page number and your suggestions for improvement.

Chapter

Product Overview

1

Overview

This chapter contains an overview of the following *FastIron X Series*® Layer 2 or Layer 3 switches:

- FastIron SX 800 (FSX 800)
- FastIron SX 1600 (FSX 1600)

Designed for medium to large enterprise backbones, *FastIron X Series* chassis devices are modular switches that provide the enterprise network with a complete end-to-end Enterprise LAN solution, ranging from the wiring closet to the LAN backbone.

Hardware benefits

FastIron X Series chassis devices provide the following benefits:

- The FSX management module is non-blocking, with a built-in switch fabric module and twelve combination Gigabit Ethernet (GbE) copper or fiber ports that provide connectivity to your existing management network.
- The FSX 800 and FSX 1600 management modules have a console port and a 10/100/1000 port that provide connectivity to your existing management network. The management modules optionally support 2-port 10-GbE ports or 8-port GbE fiber and copper ports.
- The FSX 800 and FSX 1600 management modules are interchangeable between devices. However, you cannot mix IPv4 and IPv6 modules together in the same device.
- Optional dual management modules on the FSX 800 and FSX 1600 provide 100% redundancy.
- The crossbar (xbar) architecture enables the management module to switch 30 Gigabits per second between each interface module and within the management module.
- The interface modules and power supplies are interchangeable among all *FastIron X Series* chassis devices. However, you cannot mix IPv4 and IPv6 modules together in the same device.
- The FSX 800 and FSX 1600 management, switch fabric, and interface modules are hot swappable, which means you can remove and replace them while the device is powered on and running.
- All *FastIron X Series* chassis devices have a passive backplane.
- Completely separate data and control planes for uncompromised switching performance, increased reliability of both planes, and increased security of the control plane in the event of a Denial of Service (DoS) attack on the data plane.
- Distributed data and control planes, which results in uncompromised wire-speed performance for the data plane and faster and more efficient performance of management functions for the control plane.

PoE port density

Table 1 shows the maximum PoE port density for the *FastIron X Series* chassis devices.

NOTE
For PoE+ port density, refer to "PoE+ port density" on page 2.

TABLE 1 Maximum number of PoE class 3 (15.4W) ports per power supply

Power Supply	Number of Power Supplies	FSX 800	FSX 1600
SX-ACPWR-PoE and SX-DCPWR-PoE	1	70	70
SX-ACPWR-PoE and SX-DCPWR-PoE	2	140	140
SX-ACPWR-PoE and SX-DCPWR-PoE	3	N/A	210
SX-ACPWR-PoE and SX-DCPWR-PoE	4	N/A	280
SX-ACPWR2500-PoE	1	146	140
SX-ACPWR2500-PoE	2	292[1]	280
SX-ACPWR2500-PoE	3	N/A	438[1]
SX-ACPWR2500-PoE	4	N/A	584[1]

1. The FSX 800 supports a maximum of 192 PoE ports. The FSX 1600 supports a maximum of 384 PoE ports.

PoE+ port density

NOTE
PoE+ is supported on the FI-SX-24-GPP and FI-SX48GPP interface modules for FSX 800 and FSX 1600 devices only.

To determine the maximum number of PoE+ Class (30W) ports available per power supply, use the calculation: One power supply (1080W) over power consumed by PoE+ port (30W)= 1080W/30W = 36 ports.

Table 2 shows the maximum PoE+ port density for the FI-SX-24-GPP and FI-SX48GPP interface modules.

TABLE 2 Maximum number of PoE+ class (30W) ports per power supply

Power Supply	Number of Power Supplies	FSX 800	FSX 1600
SX-ACPWR-PoE and SX-DCPWR-PoE	1	36	36
SX-ACPWR-PoE and SX-DCPWR-PoE	2	72	72
SX-ACPWR-PoE and SX-DCPWR-PoE	3	N/A	108

TABLE 2 Maximum number of PoE+ class (30W) ports per power supply

Power Supply	Number of Power Supplies	FSX 800	FSX 1600
SX-ACPWR-PoE and SX-DCPWR-PoE	4	N/A	144
SX-ACPWR2500-PoE	1	75	75
SX-ACPWR2500-PoE	2	150	150
SX-ACPWR2500-PoE	3	N/A	225
SX-ACPWR2500-PoE	4	N/A	300

Supported configurations

Premium *FastIron X Series* chassis devices support Layer 2 switching and full Layer 3 multiprotocol routing. Standard devices support Layer 2 and base Layer 3 switching. All standard *FastIron X Series* chassis devices can be upgraded to full Layer 3 multiprotocol routing, at which time they are considered to be premium devices.

Depending on the type of management module installed, IPv6 premium devices support either IPv4 multiprotocol routing and IPv6 host and management features, or IPv6 and IPv4 multiprotocol routing and IPv6 host and management features. For more information, refer to "FSX 800 and FSX 1600 management modules" on page 10 and "FSX 800 and FSX 1600 management modules" on page 10.

All *FastIron X Series* chassis devices optionally support Power over Ethernet (PoE), providing the means for integrating data, voice, and video over existing Ethernet cables.

Table 3 lists the configurations supported on the *FastIron X Series* chassis devices.

TABLE 3 FastIron X Series supported configurations

Device	Standard	Premium (PREM)	Power over Ethernet (PoE and PoE+)
FSX 800	Yes	Yes	Yes (FI-SX-24-GPP and FI-SX48GPP modules only)
FSX 1600	Yes	Yes	Yes (FI-SX-24-GPP and FI-SX48GPP modules only)

Software features

Software features differ depending on the software version that is loaded on the device and the type of management module that is installed in the device. Refer to the *FastIron Configuration Guide* for a complete list of software features supported on your device.

PoE and PoE+ applications

Brocade *FastIron X Series* chassis devices with PoE and PoE+ provide Power over Ethernet, compliant with the standards described in the IEEE 802.3af and 802.3at specification for delivering in-line power. The specifications define the standard for delivering power over existing network cabling infrastructure, enabling multicast-enabled full streaming audio and video applications for converged services, such as, Voice over IP (VoIP), WLAN access points, IP surveillance cameras, and other IP technology devices.

PoE technology eliminates the need for an electrical outlet and dedicated UPS near IP powered devices. With power sourcing devices, such as Brocade's *FastIron X Series* chassis devices with PoE and PoE+, power is consolidated and centralized in the wiring closets, improving the reliability and resiliency of the network. Because PoE can provide power over Ethernet cable, power is continuous, even in the event of a power failure.

For PoE port density, refer to "PoE port density" on page 2. For PoE+ port density, refer to "PoE+ port density" on page 2

For more information about PoE and PoE+ and how to configure it, refer to the *FastIron Configuration Guide*.

Support for IPv6 modules

FastIron X Series chassis devices support IPv6 management and interface modules.

For details about IPv6 modules, refer to the following sections in this chapter:

- "IPv6 hardware support guidelines"
- "FSX 800 and FSX 1600 management modules" on page 10
- "FSX 800 and FSX 1600 management modules" on page 10
- "Interface modules" on page 13

IPv6 hardware support guidelines

The following guidelines and restrictions apply to IPv6 management and interface modules:

- You cannot mix IPv4 and IPv6 modules together in the same FastIron device.
- If you install dual IPv6 management modules, the modules must be identical. For example, you cannot install one 2-port management module and one 8-port management module together in the same device.

Hardware features

The *FastIron X Series* chassis devices are composed of the following major hardware components:

- Chassis

- Management module
  - The FSX management module has a built-in switch fabric module.
  - The FSX 800 and FSX 1600 optionally support dual management modules which provide 100% redundancy.
- Separate switch fabric modules (FSX 800 and FSX 1600 only)
- Interface modules
- Power supplies
- The fan tray in the FSX 800 is composed of six fans and a fan control module.
- The FSX 1600 has an air filter in the bottom front of the chassis and two fan trays at the rear of the chassis.
- Built-in mounting brackets

The following sections provide more information about these components.

For details about physical dimensions, power supply specifications, and pinouts, refer to Chapter 7, “Hardware Specifications”.

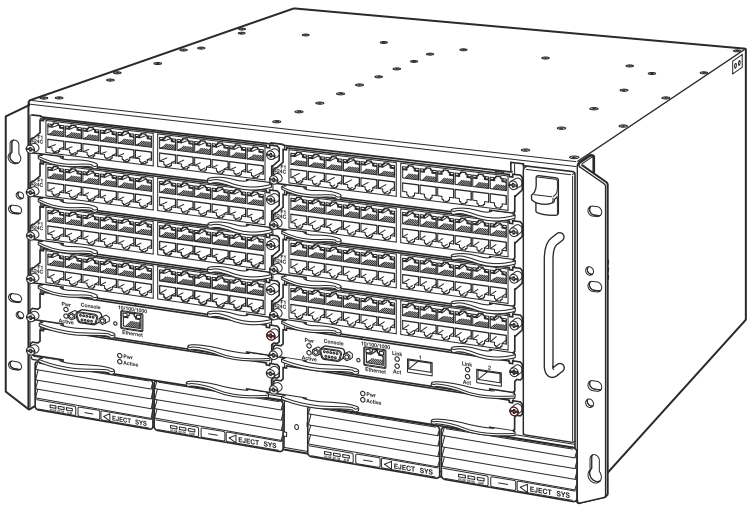
FSX 800 chassis

The FSX 800 chassis is six rack units in height and contains the following component slots:

- Two half slots for the management modules
- Two half slots for the switch fabric modules
- Eight half slots for the interface modules
- Four slots for power supplies along the bottom of the card shelf. The power supply slots add an additional rack unit (RU) to the height of the chassis.

Figure 1 shows the FSX 800 chassis and the component slots.

FIGURE 1 FSX 800 chassis



The FSX 800 chassis ships from the factory with the following components installed:

- Two switch fabric modules
- A slot panel in each empty interface module slot and power supply slot. The slot panel ensures proper airflow within the chassis.
- One AC power supply
- A fan tray assembly, which contains the cooling system for the chassis

You can install the following components in the FSX 800 slots:

- Up to two management modules
- Up to eight interface modules
- Up to four AC and DC power supplies: two system (12-volt) power supplies and two PoE (52-54-volt or 220-volt) power supplies

Before installing any modules or power supplies, you must remove the slot panel.

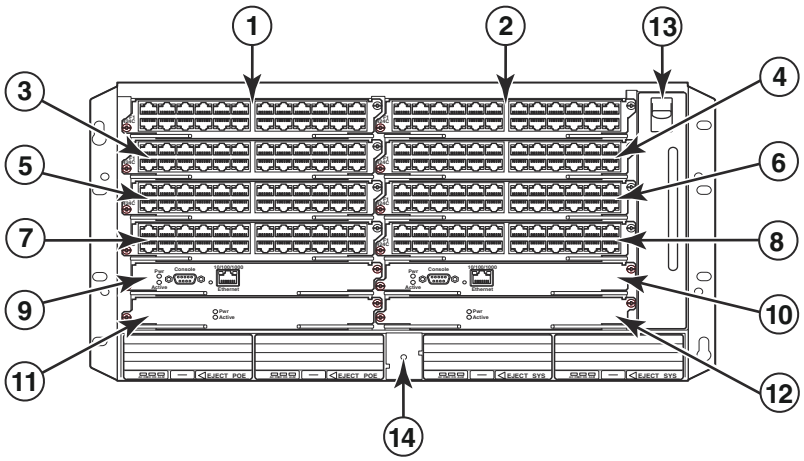
CAUTION

If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Figure 2 shows the FSX 800 slots where you install modules and power supplies, and the electrostatic discharge (ESD) connector, into which you can plug an ESD wrist strap to ground yourself while handling and installing modules.

.

FIGURE 2 FSX 800 module slots



1	Slot 1	8	Slot 8
2	Slot 2	9	Slot 9
3	Slot 3	10	Slot 10
4	Slot 4	11	Switch Fabric Slot 1

5	Slot 5	12	Switch Fabric Slot 2
6	Slot 6	13	Fan tray
7	Slot 7	14	ESD connector

DANGER

For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

FSX 1600 chassis

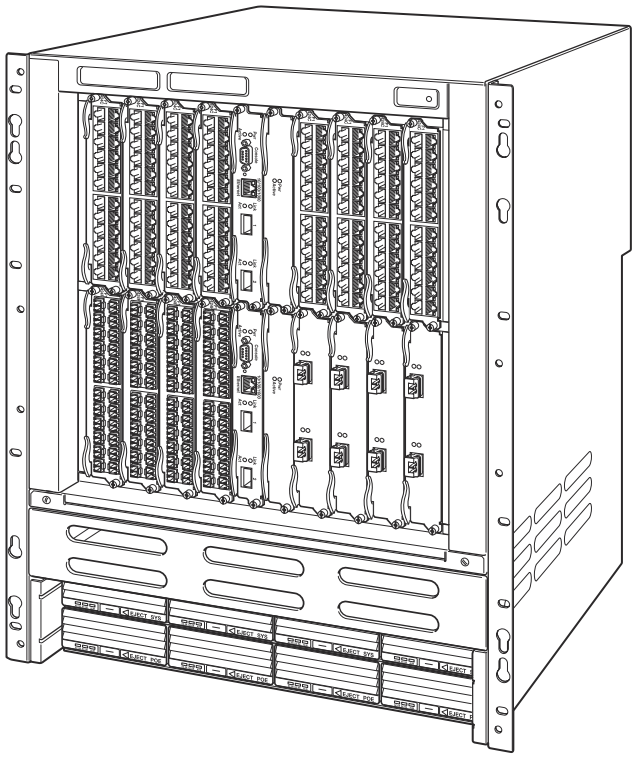
Part numbers for the FSX 1600 chassis and bundles begin with **FI-SX-1600-***xxx*.

The FSX 1600 chassis is 14 rack units in height and contains the following component slots:

- Two half slots for the management modules
- Two half slots for the switch fabric modules
- Sixteen half slots for the interface modules
- Eight slots for power supplies along the bottom of the card shelf

Figure 3 shows the front of the FSX 1600 device.

FIGURE 3 FSX 1600 device



FSX 1600 devices ship from the factory with the following components installed:

- Two switch fabric modules
- A slot panel in each empty interface module slot and power supply slot. The slot panel ensures proper airflow within the chassis.
- Two AC power supplies
- A fan tray assembly, which contains the cooling system for the chassis

You can install the following components in the slots:

- Up to two management modules
- Up to 16 interface modules
- Up to eight AC or DC power supplies (four system (SYS) power supplies and four PoE power supplies)

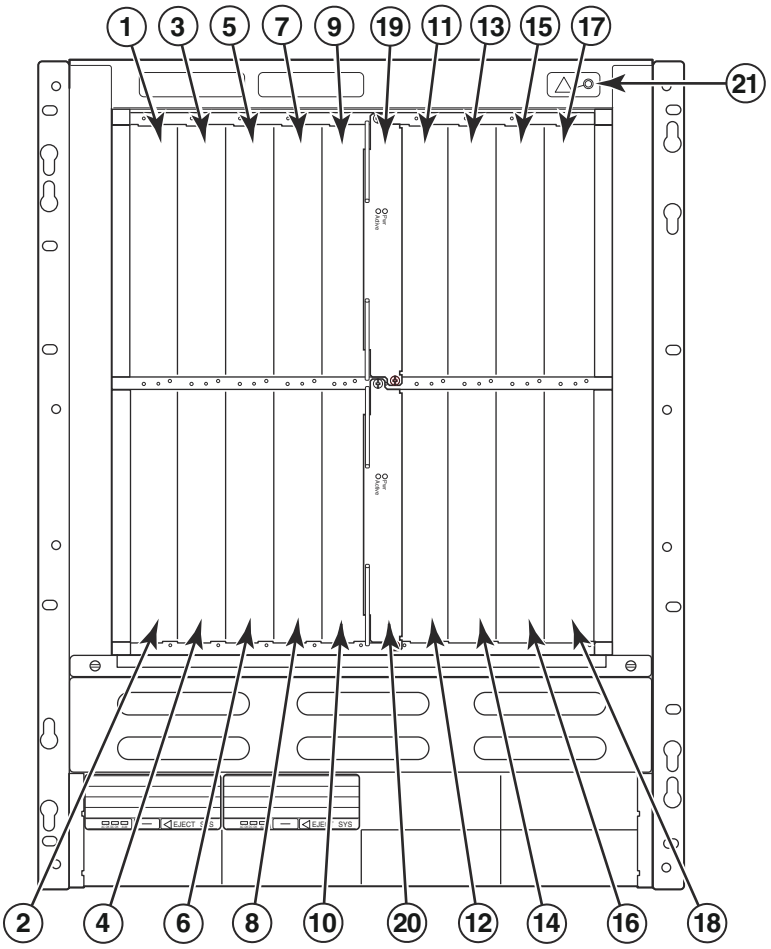
Before installing any modules or power supplies, you must remove the slot panel.

CAUTION

If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Figure 4 identifies the slots where you can install modules and power supplies, and the electrostatic discharge (ESD) connector, into which you can plug an ESD wrist strap to ground yourself while handling and installing modules.

FIGURE 4 FSX 1600 slots



1	Interface slot 1	8	Interface slot 8	15	Interface slot 15
2	Interface slot 2	9	Management slot 9	16	Interface slot 16
3	Interface slot 3	10	Management slot 10	17	Interface slot 17
4	Interface slot 4	11	Interface slot 11	18	Interface slot 18
5	interface slot 5	12	Interface slot 12	19	Switch fabric slot 1
6	Interface slot 6	13	Interface slot 13	20	Switch fabric slot 2
7	Interface slot 7	14	Interface slot 14	21	ESD ground connector

DANGER

For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

Management modules

The FSX 800 and FSX 1600 device each require one management module and optionally support two management modules for 100% redundancy. Each management module occupies one half slot.

FSX 800 and FSX 1600 management modules

Management modules for the FSX 800 and FSX 1600 are interchangeable between devices. Standard management modules provide Layer 2 and base Layer 3 functionality only. Premium management modules support full Layer 3 functionality.

NOTE
FSX 800 and FSX 1600 management modules are dedicated, which means that you must install them in FSX 800 or FSX 1600 devices only. If you attempt to install these management modules in the FSX or other Brocade device, the device and modules will not function properly.

NOTE
You cannot mix different management modules in the same FSX 800 or FSX 1600 device. The management module models must be identical.

NOTE
You cannot mix IPv6 and IPv4 modules in the same FSX 800 or FSX 1600 device.

Table 4 lists the management modules for FSX 800 and FSX 1600 devices.

TABLE 4 FSX 800 and FSX 1600 management modules

Part Number	Description	Microprocessor Speed (MHz)	MB SDRAM
IPv4 management modules			
SX-FIZMR	no ports	667	512
SX-FIZMR-PREM			
SX-FI2XGMR4	two 10-GbE ports	667	512
SX-FI2XGMR4-PREM			
IPv6 management modules			
SX-FIZMR	no ports	667	512
SX-FIZMR-6-PREM			
SX-FIZMR-6-PREM6			
SX-FI2XGMR6	two 10-GbE ports	667	512
SX-FI2XGMR6-PREM			
SX-FI2XGMR6-PREM6			

NOTE
512 MB SDRAM supports large routing tables (1,000,000 BGP routes) with the full Layer 3 code.

NOTE
IPv6 management modules ending with **-PREM** support full Layer 3 IPv4 routing protocols. IPv6 management modules ending with **-PREM6** support full Layer 3 IPv4 and IPv6 routing protocols.

FSX 800 and FSX 1600 management modules perform the following tasks:

- Control the hardware components
- Control the separate switch fabric modules
- Run the networking protocols
- Provide the real time operating system

FSX 800 management modules are located in slots 9 and 10, just above the switch module slots (refer to Figure 2).

FSX 1600 management modules are located in slots 9 and 10 along the center of the device (refer to Figure 4).

Figure 5 shows the front panel of IPv4 and IPv6 management modules with no ports.

FIGURE 5 FSX 800 and FSX 1600 management module with no ports

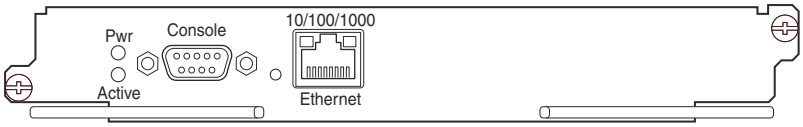
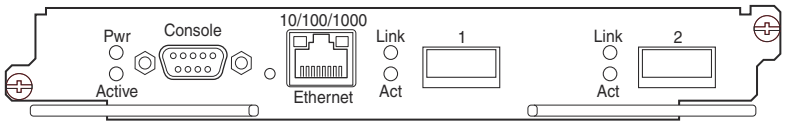


Figure 6 shows the front panel of IPv4 and IPv6 management modules with two 10-GbE ports.

FIGURE 6 FSX 800 and FSX 1600 management module with two 10-GbE ports



Management module front panels include the following control features:

- A Console port and 10/100/1000 RJ-45 copper port allow you to access the command line interface (CLI) directly from a PC or terminal or through a Telnet connection.
- Depending on the type of management modules installed, the following ports are available:
  - no 10-GbE fiber ports
  - two 10-GbE fiber ports
- LEDs for power and active or standby status
- Four LEDs for the two 10-GbE fiber ports (2-port 10-GbE modules only)
- A recessed reset button

10/100/1000 GbE copper port on the FSX 800 and FSX 1600 management modules

The 10/100/1000 RJ45 copper port on the management module enables you to attach a PC or terminal and access the system CLI or Web Management Interface directly or through a Telnet connection.

10-GbE ports on the FSX 800 and FSX 1600 2-port 10-GbE management modules

FSX 800 and FSX 1600 2-port 10-GbE management modules contain two 10-GbE fiber ports through which you can connect your device to other network devices at a speed of 10 Gigabits per second.

The 10-GbE ports have optical interfaces with LC connectors for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant transceivers. The transceivers support the fiber optic cabling for LAN PHY listed in Table 34 on page 151.

LEDs on the FSX 800 and FSX 1600 management modules

The management modules provide status information through the LEDs listed in Table 5.

TABLE 5 FSX 800 and FSX 1600 management module LEDs

LED	Description and Position	State	Meaning
Pwr	Round LED located to the left of the console port	On (Green)	The module is receiving power.
		Off	The module is not receiving power.
Active	Round LED located to the left of the console port	On (Green)	The module is the active management module.
		Off	The module is not the active management module.
10/100/1000 Copper Port LEDs			
Lnk	Left-most LED above the port	On	The port is connected.
		Off	No port connection exists.
Act	Right-most LED above the port.	On or Blinking	The port is transmitting and receiving traffic.
		Off	The port is not transmitting or receiving traffic.
10-GbE Port LEDs			
Lnk	Top-most LED to the left of the port.	On	Fiber port is connected.
		Off	No fiber port connection exists.
Act	Bottom-most LED to the left of the port.	On or Blinking	The port is transmitting and receiving traffic.
		Off	The port is not transmitting or receiving traffic.

Console port

The Console port on the management module is a standard DB-9 serial connector through which you can attach a PC or terminal to configure the system using the command line interface (CLI).

The Console port interfaces with the control plane only and does not interface with the data plane.

Reset button

The reset button on the management module allows you to restart the system. The reset button is recessed to prevent it from being pushed accidentally.

The reset button is located next to the console port on the management module.

Switch fabric modules

Switch fabric modules switch user packets from one interface module to another. Switch fabric modules in the FSX 800 and FSX 1600 devices are separate and are located next to the management modules in the device.

Figure 7 shows an FSX 800 and FSX 1600 switch fabric module front panel.

FIGURE 7 FSX 800 and FSX 1600 switch fabric module front panel

Switch fabric module LEDs

The front panel provides status information through the LEDs listed in Table 6.

TABLE 6 Switch fabric module LEDs

LED	Description and Position	State	Meaning
Pwr	Top LED	On (Green)	The module is receiving power.
		Off	The module is not receiving power.
Active	Bottom LED	On (Green)	The module is functioning properly.
		Off	The module is not functioning properly.

Interface modules

This section describes interface modules for the *FastIron X Series* chassis devices. The following installation rules apply:

- In the FSX 800 device, you can install up to eight interface modules in the slots shown in Figure 2 on page 6.
- In the FSX 1600 device, you can install up to 16 interface modules in the slots shown in Figure 4 on page 9.

NOTE
You cannot mix IPv4 and IPv6 modules in the same device.

Table 7 lists the supported interface modules for each *FastIron X Series* chassis device type.

TABLE 7 Interface modules

Interface Module	Part Number	FSX 800	FSX 1600
IPv4 Interface Modules			
24-port Gigabit Ethernet Fiber (1000 Mbps only)	SX-FI424F	X	X
24-port Gigabit Ethernet copper without PoE	SX-FI424C	X	X

TABLE 7 Interface modules (Continued)

Interface Module	Part Number	FSX 800	FSX 1600
24-port Gigabit Ethernet copper with PoE	SX-FI424P	X	X
24-port 100/1000 Hybrid Fiber	SX-FI424HF	X	X
2-port 10-Gigabit Ethernet LAN module	SX-FI42XG	X	X
2-port 10-Gigabit Ethernet LAN or WAN module	SX-FI42XGW	X	X
IPv6 Interface Modules			
24-port Gigabit Ethernet copper without PoE	SX-FI624C	X	X
24-port Gigabit Ethernet copper with PoE	SX-FI624P	X	X
24-port 100/1000 Hybrid Fiber	SX-FI624HF	X	X
2-port 10-Gigabit Ethernet LAN module	SX-FI62XG	X	X
IPv4 and IPv6 Interface Modules			
24-port Gigabit Ethernet copper interface module with PoE+	SX-FI-24GPP	X	X
24-port Gigabit Ethernet fiber interface module	SX-FI-24HF	X	X
2-port 10-Gigabit Ethernet interface module	SX-FI-2XG	X	X
8-port 10-Gigabit Ethernet interface module	SX-FI-8XG	X	X
48-port 10/100/1000 Mbps RJ45 Ethernet module with PoE+	SX-FI48GPP	X	X

Hot swap support

- Interface modules are hot swappable, which means you can remove and replace them without powering down the system; however, you must issue the **disable module** command before you remove the modules from the device.
- Issuing the **disable module** command before removing the module is not required on the FSX 800 and FSX 1600 device. This is referred to as “Enhanced Hot Swap”.
- Do not perform both hotswap removal and hot swap insertion of another line module while hot swap of a line module is taking place. Wait until the current hot swap of the line module is completed. The following message indicates that the hot swap insertion of a module is completed:

  ```
  Module 1 is up and running
  ```

  The following console message indicates that the hot swap removal of a module is completed:

  ```
  Powering off the module in slot 1
  ```

CAUTION

It is recommended that modules be disabled through the CLI before removal from the device. If the operator wishes to remove the module without first disabling the module, the Enhanced Hot Swap capability in software Release 03.2.00 and later supports this procedure for the FastIron SX 800 and FastIron SX 1600 device. Enhanced Hot Swap (that is, no CLI disable) should be performed during a maintenance window. On rare occasions, an Enhanced Hot Swap may result in a software reload of the system. The likelihood of this event is very low.

CAUTION

It is important to wait a minimum of 10 seconds between the removal and insertion of a line module. Re-insertion of a line module less than 10 seconds after the removal of a line module may result in the line module not being properly recognized.

Refer to "Replacing an interface module" on page 112 for instructions.

48-port 10/100/1000 Mbps (RJ45) Ethernet PoE interface module

The 48-port 10/100/1000 Mbps Ethernet PoE interface module (SX-FI48GPP) uses two vertical half-slots in the FastIron SX 800 or 1600 device and is supported in IPv4-only and IPv6-capable systems. The ports support automatic MDI or MDIX detection, and use auto-sensing and auto-negotiating to determine the speed (10, 100, or 1000 Mbps) and duplex mode (full-duplex or half-duplex) of the port at the other end of the link, and adjust the local port accordingly. Ports running at 1000 Mbps operate in full-duplex mode only and cannot be modified.

The module is 2:1 oversubscribed with an intelligent queue in front of the module packet processor. Traffic on each port can be classified as high or low priority, and can be scheduled from a queue using these priority settings ensuring QoS from the port of entry into the network. This module is interoperable with IPv6 SX-FI6xx modules, SX-FI4xx module and associated management modules. The module requires Ironware 7.2 or later for FastIron series.

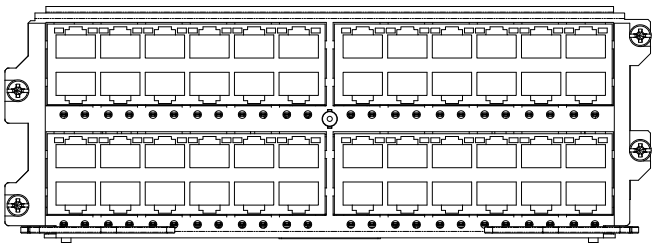
2:1 oversubscription

Interface oversubscription is the use of a single physical ingress port to handle incoming traffic from multiple devices, and is usually expressed as a ratio; the ratio shows the proportion of incoming connections to physical ports carrying traffic to the backplane of the device. The FastIron supports 2:1 oversubscription, allowing two devices to pass traffic through a single internal physical port to take advantage of bandwidth which might otherwise go unused.

Oversubscription is achieved on the SX-FI48GPP by connecting 48 external ports to 24 internal physical ports, providing 2:1 oversubscription. No CLI command is required to enable oversubscription, but because two external ports are funneling traffic into each physical link, the FastIron uses virtual interfaces (VEs) to divide each physical link into two logical ports. These VEs can then be individually configured at the interface level.

NOTE
This interface module is not supported on FastIron SuperX devices.

FIGURE 8 48-port 10/100/1000 Mbps Ethernet PoE interface module front panel



LEDs for the 48-port 10/100/1000 Mbps Ethernet PoE interface module

The front panel of the 48-port 10/100/1000 Mbps Ethernet interface module includes 48 LEDs that indicate the status of each port, and 48 LEDs that indicate the status of PoE+. The first 24 LEDs are located below the first 24 ports and the remaining 24 LEDs are located below the remaining 24 ports.

NOTE
The PoE LEDs work only when PoE is enabled on your device.

The 48-port 10/100/1000 Mpbs Ethernet PoE interface module supports Power over Ethernet (PoE+). To run PoE+ on your system, you must also install at least one 48-volt to 54-volt power supply.

The module ports provide status information through the LEDs described in Table 10.

TABLE 8 LEDs for the 48-port 10/100/1000 Mbps Ethernet PoE interface module

LED	Position	State	Meaning
Link or Activity	Square LED located at upper left corner of top port (for top port) Square LED located at upper right corner of top port (for bottom port)	On (Green)	A link is established with the remote port.
		Blinking	The port is transmitting and receiving traffic.
		Off	No link exists with the remote port.
PoE (if applicable)	Round LED located beneath the ports. The first (left-most) LED is for port 1, the second LED is for port 2, the third LED is for port 3, etc.	On (Green)	The port is enabled, a power-consuming device has been detected, and the module is supplying power to the device.
		Off	The port is not providing in-line power.

NOTE
This module occupies two slot spaces, and can be installed in certain slots only. For details refer to Table 19 on page 46.

48-port 10/100/1000 Mbps Ethernet PoE+ interface module limitations

The following limitations apply to this module:

- Q-in-Q and SAV (VLAN stacking) are not supported on this module

- For systems with this module and IPv4 and IPv6 interface modules or management modules with user ports:
  - GRE tunnels and IPv6 over IPv4 tunnels are not supported
  - Legacy ports and 48 Gbps copper ports cannot be members of the same trunk

24-port Gigabit Ethernet copper interface module

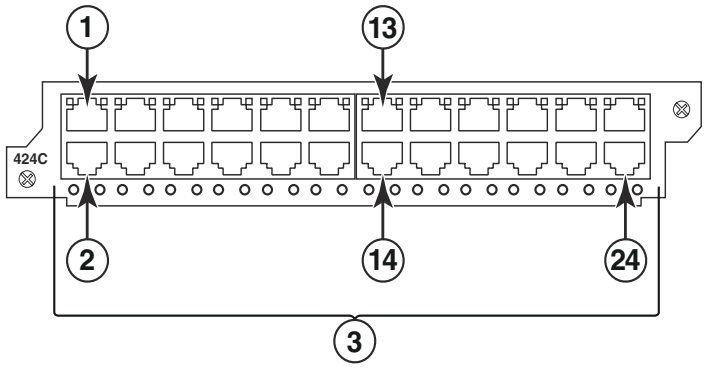
The IPv4 or IPv6 24-port Gigabit Ethernet copper interface module has 24 10/100/1000 ports with RJ45 connectors for Cat5 cabling. The copper ports support automatic MDI or MDIX detection, and use auto-sensing and auto-negotiating to determine the speed (10, 100, or 1000 Mbps) and duplex mode (full-duplex or half-duplex) of the port at the other end of the link, and adjust the port accordingly. Ports running at 1000 Mbps operate in full-duplex mode only and cannot be modified.

The 24-port Gigabit Ethernet copper interface module supports Power over Ethernet (PoE). You can either order the interface module with PoE capability, or upgrade your existing 24-port Gigabit Ethernet Copper module by installing a PoE daughter card. To run PoE on your system, you must also install at least one 48-volt power supply.

NOTE
Instructions for installing a PoE daughter card are provided in "Installing or replacing a POE daughter card" on page 124.

Figure 9 shows the front panel of the IPv4 24-port Gigabit Ethernet copper module.

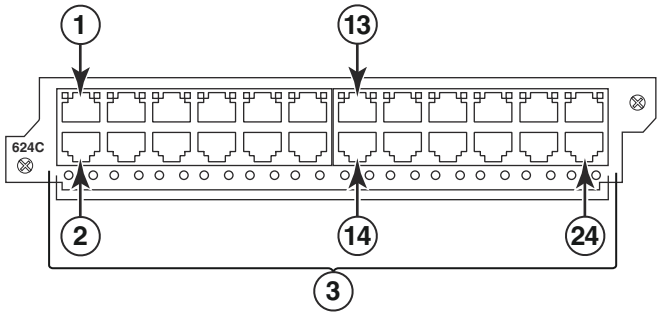
FIGURE 9 IPv4 24-port Gigabit Ethernet copper module front panel



1	Port 1	13	Port 13	24	Port 24
2	Port 2	14	Port 14		

Figure 10 shows the front panel of the IPv6 24-port Gigabit Ethernet copper module.

FIGURE 10 IPv6 24-port Gigabit Ethernet copper module front panel



1	Port 1	13	Port 13	24	Port 24
2	Port 2	14	Port 14		

The front panel includes the following control features:

- 24 10/100/1000 copper ports
- 24 LEDs for port status
- 24 LEDs for PoE status

NOTE
The PoE LEDs work only when PoE is enabled on your device.

LEDs for 24-port copper module

The front panel of the 24-port Gigabit Ethernet copper module includes 24 LEDs (top) that indicate the status of each port, and 24 LEDs (bottom) that indicate the PoE status.

NOTE
The PoE LEDs work only when PoE is enabled on your device.

The copper ports provide status information using the LEDs described in Table 10.

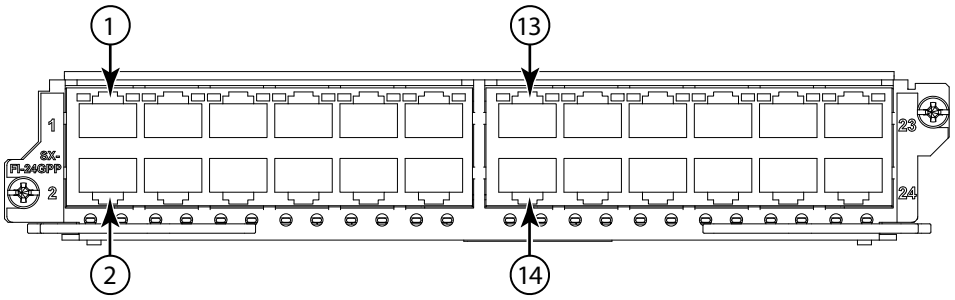
TABLE 9 LEDs for 10/100/1000 copper ports

LED	Position	State	Meaning
Link or Activity	Square LED located at upper left corner of to port (for top port) Square LED located at upper right corner of top port (for bottom port)	On (Green)	A link is established with the remote port.
		Blinking	The port is transmitting and receiving traffic.
		Off	No link exists with the remote port.
PoE (if applicable)	Round LED located beneath the ports. The first (left-most) LED is for port 1, the second LED is for port 2, the third LED is for port 3, etc.	On (Green)	The port is enabled, a power-consuming device has been detected, and the module is supplying power to the device.
		Off	The port is not providing in-line power.

24-port Gigabit Ethernet copper module with PoE+

The 24-port Gigabit Ethernet copper interface module with PoE+ supports both IPv4 and IPv6. Figure 11 shows the front panel of the IPv4 and IPv6 24-port Gigabit Ethernet copper interface module with PoE+. The module requires Ironware 7.3 or later for FastIron series.

FIGURE 11 24-port Gigabit Ethernet copper module with PoE+ front panel



1 Port 1 13 Port 13

2 Port 2 14 Port 14

The front panel includes the following control features:

- 24 10/100/1000 copper ports
- 24 LEDs for port status
- 24 LEDs for PoE status

LEDs for 24-port copper module with PoE+

The front panel of the 24-port Gigabit Ethernet copper module includes 24 LEDs (top) that indicate the status of each port, and 24 LEDs (bottom) that indicate the PoE status.

The copper ports provide status information using the LEDs described in Table 10.

TABLE 10 LEDs for 10/100/1000 copper ports

LED	Position	State	Meaning
Link or Activity	Square LED located at upper left corner of to port (for top port) Square LED located at upper right corner of top port (for bottom port)	On (Green)	A link is established with the remote port.
		Blinking	The port is transmitting and receiving traffic.
		Off	No link exists with the remote port.
PoE or PoE+(if applicable)	Round LED located beneath the ports. The first (left-most) LED is for port 1, the second LED is for port 2, the third LED is for port 3, etc.	On (Green)	The port is enabled, a power-consuming device has been detected, and the module is supplying power to the device.
		Off	The port is not providing in-line power.

24-port Gigabit Ethernet fiber interface module

The IPv4 24-port Gigabit Ethernet fiber interface module and the IPv4 and IPv6 24-port Gigabit Ethernet fiber interface module have 24 ports with connectors for mini-GBIC transceivers (Small Form Factor Pluggable or SFP) Multisource Agreement (MSA)-compliant transceivers. The ports support both fiber and copper mini-GBICs in any combination.

NOTE
The copper mini-GBICs are not supported on the combination Gigabit Ethernet copper and fiber ports of the FSX management module.

The ports on the 24-port Gigabit Ethernet fiber modules operate at a fixed speed of 1000 Mbps (they do not support 10 Mbps or 100 Mbps connections). In addition, these ports operate in full-duplex mode only, and use auto-negotiation to automatically configure the highest performance mode of inter-operation with the connected device.

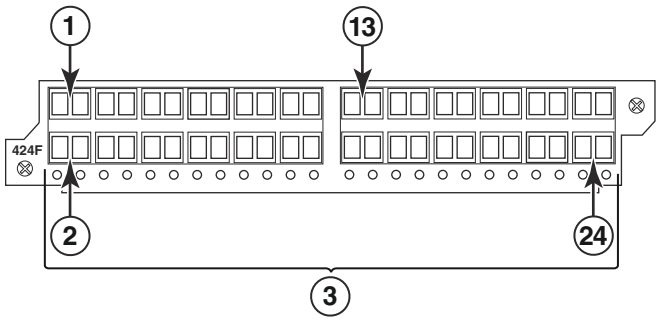
The SX-FI-24H module supporting both IPv4 and IPv6 requires Ironware 7.3 or later for FastIron series.

The mini-GBIC slots support the types of 1000 Base fiber and copper cabling listed in "Network interfaces" on page 25.

NOTE
Some older SFP modules (mini-GBICs for Gigabit Ethernet ports) have latching mechanisms which are larger than the newer parts. These latches could interfere with one another when inserted side-by-side into a module. Avoid using these mini-GBICs side-by-side in the same module. These older modules are identified by the number PL-XPL-00-S13-22 or PL-XPL-00-L13-23 above the Serial Number. All newer mini-GBICs do not have this limitation.

Figure 12 shows the front panel of the IPv4 24-port Gigabit Ethernet fiber module.

FIGURE 12 IPv4 24-port Gigabit Ethernet fiber module front panel



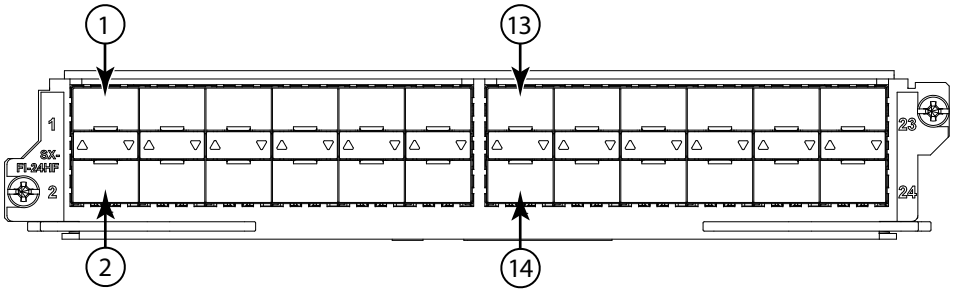
1	Port 1	13	Port 13
2	Port 2	24	Port 24

The front panel includes the following control features:

- 24 Gigabit Ethernet fiber ports
- 24 LEDs

Figure 13 shows the front panel of the IPv4 and IPv6 24-port Gigabit Ethernet fiber module.

FIGURE 13 IPv4 and IPv6 24-port Gigabit Ethernet fiber module front panel



1	Port 1	13	Port 13
2	Port 2	14	Port 14

The front panel includes the following control features:

- 24 Gigabit Ethernet fiber ports
- 24 LEDs

LEDs for 24-port fiber module supporting IPv4

The fiber module front panel includes 24 LEDs that indicate the status of each port. The LEDs are located beneath the mini-GBIC slots for the ports (refer to Figure 12). The left-most LED is for Port 1, the second LED is for Port 2, and so on.

The ports provide status information using the LEDs described in Table 11.

TABLE 11 LEDs for 1000 Mbps ports on the 24-port fiber module

LED	Position	State	Meaning
Link or Activity	Round LED located beneath the fiber ports	On (Green)	A link is established with the remote port.
		Blinking	The port is transmitting and receiving packets.
		Off	No link exists with the remote port.

Figure 12 shows the front panel of the IPv4 24-port Gigabit Ethernet fiber module.

LEDs for 24-port fiber module supporting IPv4 and IPv6

The fiber module front panel includes 24 LEDs that indicate the status of each port. The LEDs are located beneath the mini-GBIC slots for the ports (refer to Figure 13). The left-most LED is for Port 1, the second LED is for Port 2, and so on.

The ports provide status information using the LEDs described in Table 12.

TABLE 12 LEDs for 1000 Mbps ports on the 24-port fiber module

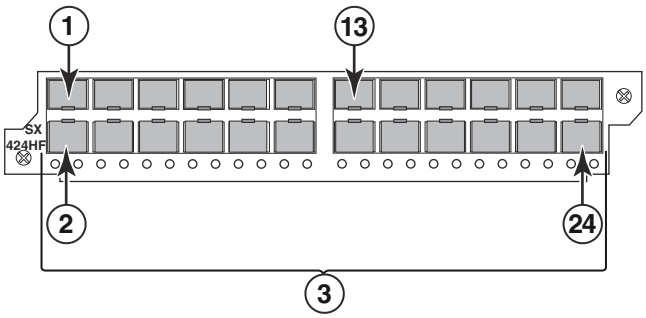
LED	Position	State	Meaning
Link or Activity	Triangle-shaped LEDs point either upwards or downwards towards the port they indicate. The first (left-most) LED is for Port 1, the second LED is for Port 2, the third LED is for Port 3, etc.	On (Green)	A link is established with the remote port.
		Blinking	The port is transmitting and receiving packets.
		Off	No link exists with the remote port.

24-port 100/1000 hybrid fiber interface module

The 100/1000 hybrid fiber module has 24 ports with connectors for mini-GBIC transceivers (also called Small Form Factor Pluggable or SFP) Multisource Agreement (MSA)-compliant transceivers. The ports support 100 and 1000 fiber mini-GBICs.

Figure 14 shows the IPv4 100/1000 hybrid fiber interface module front panel.

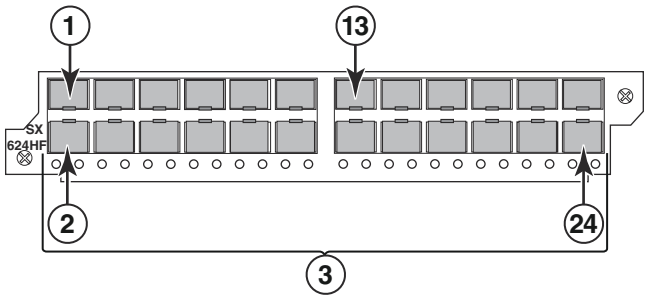
FIGURE 14 IPv4 100/1000 hybrid fiber interface module front panel



1	Port 1	13	Port 13
2	Port 2	24	Port 24

Figure 15 shows the IPv6 100/1000 hybrid fiber interface module front panel.

FIGURE 15 IPv6 100/1000 hybrid fiber interface module front panel



1	Port 1	13	Port 13
2	Port 2	24	Port 24

The front panel contains the following control features:

- 24 Gigabit Ethernet fiber ports
- 24 LEDs

The ports on the 24-port 100/1000 Gigabit Ethernet hybrid fiber module operate at a fixed speed of 100 or 1000 Mbps (they do not support 10 Mbps connections), and use auto-negotiation to automatically configure the highest performance mode with the connected device.

The mini-GBIC slots support the 100Base and 1000Base fiber cabling listed in "Network interfaces" on page 25.

Support for 100Base-FX on the 100/1000 interface module

The 24-port 100/1000 fiber interface module supports the following types of SFPs for 100Base-FX:

- Multimode SFP – maximum distance is 2 kilometers
- Bidirectional single mode SFP – maximum distance is 10 kilometers
- Long Reach (LR) – maximum distance is 40 kilometers
- Intermediate Reach (IR) – maximum distance is 15 kilometers

To enable support for 100BaseFX, you must enter the CLI command 100-fx at the interface level of the CLI. For CLI command details, refer to the section "Enabling and Disabling Support for 100BaseFX" in the *FastIron Configuration Guide*.

2-port 10-Gigabit Ethernet interface modules

2-port 10-Gigabit Ethernet interface modules have two physical ports, through which you can connect the Brocade device to other network devices at a speed of 10 Gigabits per second.

The modules have two optical interfaces with LC connectors for 10-Gigabit SamII Form Factor Pluggable (SFP+) MSA-compliant transceivers. On IPv4 2-port 10-Gigabit Ethernet interface modules and the IPv6 2-port 10-Gigabit Ethernet interface modules (these modules support either IPv4 or IPv6 exclusively), the transceivers support 10GBase-SR, 10GBase-LR, and 10GBase-ER fiber optic cabling for LAN PHY or WAN PHY (LAN or WAN module only). On 2-port 10-Gigabit Ethernet interface modules supporting both IPv4 and IPv6, the transceivers support 10GBase-SR, 10GBase-LR, and 10GBase-ER fiber optic cabling for LAN.

Figure 16 shows the IPv4 2-port 10-Gigabit Ethernet module front panel.

FIGURE 16 IPv4 2-port 10-Gigabit Ethernet interface module

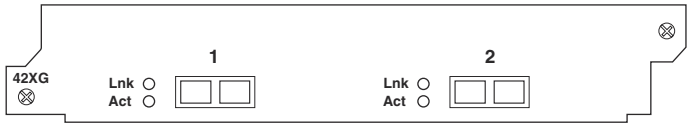


Figure 17 shows the IPv6 2-port 10-Gigabit Ethernet module front panel.

FIGURE 17 IPv6 2-port 10-Gigabit Ethernet interface module

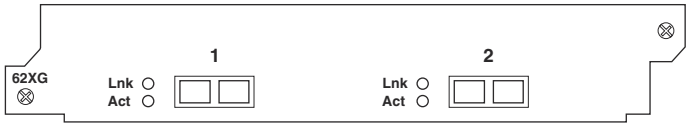
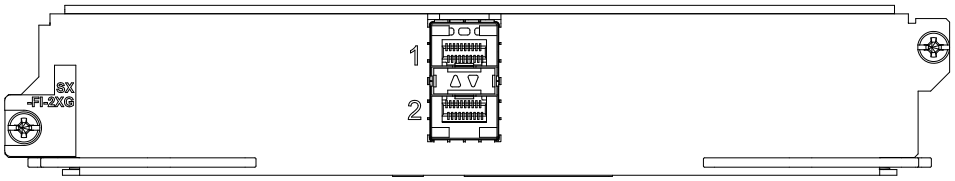


Figure 18 shows the IPv4 and IPv6 2-port 10-Gigabit Ethernet module front panel.

FIGURE 18 IPv4 and IPv6 2-port 10-Gigabit Ethernet interface module



LEDs for IPv4 2-Port 10-Gigabit Ethernet module and IPv6 2-port 10-Gigabit Ethernet module

The 10 Gbps ports provide status information using the LEDs listed in Table 14.

TABLE 13 LEDs for 10 Gbps ports

LED	Position	State	Meaning
Lnk	Top left of connector	On	Fiber port is connected.
		Off	No fiber port connection exists.
Act	Bottom left of connector	On or Blinking	The port is transmitting and receiving traffic.
		Off	The port is not transmitting or receiving traffic.

LEDs for IPv4 and IPv6 2-Port 10-Gigabit Ethernet module

The 10 Gbps ports provide status information using the LEDs listed in Table 14.

TABLE 14 LEDs for 10 Gbps ports

LED	Position	State	Meaning
Link or Activity	Triangle-shaped LEDs point either upwards or downwards towards the port they indicate	ON (Green)	The por t is connected, a link is established with the remote port.
		Blinking	The port is transmitting or receiving traffic.
		OFF	The port is not connected, no link exists with the remote port

8-port 10-Gigabit Ethernet interface modules

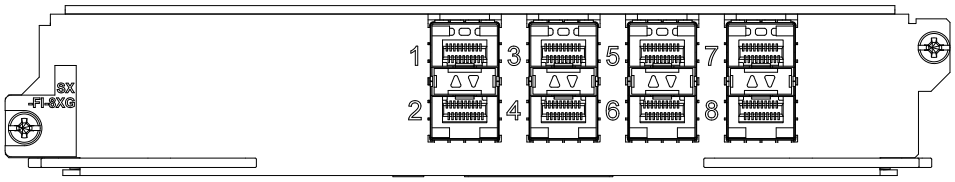
IPv4 and IPv6 8-port 10-Gigabit Ethernet interface modules have eight physical ports, through which you can connect the Brocade device to other network devices at a speed of 10 Gigabits per second.

The modules have two optical interfaces with LC connectors for 10-Gigabit Small Form Factor Pluggable (SFP+) MSA-compliant transceivers. The transceivers support 10GBase-SR, 10GBase-LR, and 10GBase-ER fiber optic cabling for LAN.

The module requires Ironware 7.3 or later for FastIron series.

Figure 19 shows the IPv4 8-port 10-Gigabit Ethernet module front panel.

FIGURE 19 IPv4 and IPv6 8-port 10-Gigabit Ethernet interface module



The 10 Gbps ports provide status information using the LEDs listed in Table 15.

TABLE 15 LEDs for 10 Gbps ports

LED	Position	State	Meaning
Link or Activity	Triangle-shaped LEDs point either upwards or downwards towards the port it indicates	ON (Green)	The por t is connected, a link is established with the remote port.
		Blinking	The port is transmitting or receiving traffic.
		OFF	The port is not connected, no link exists with the remote port

Network interfaces

Table 16 lists the network interfaces supported on *FastIron X Series* chassis devices. For network interface and cabling specifications, refer to Table 34 on page 151.

The output of the **show media** command displays the type of media installed in the ports.

TABLE 16 Network interfaces

Interface	Show Media Description
1000Base-BX-D	M-GBXD
1000Base-BX-U	M-GBXU
1000Base-CWDM	C*xxxx* (xxx denotes wavelength, for example, C1550
1000Base-LHA	M-LHA
1000Base-LHB	M-LHB
1000Base-LX	M-LX
1000Base-SX	M-SX
1000Base-SX2	M-XR or M-SX2
1000Base-T	M-C
100Base-BX	M-FBXD or M-FBXU
100Base-FX	M-FX, M-FXB1, or M-FXB2
100Base-FX-IR	M-FX-IR
100Base-FX-LR	M-FX-LR
100Base-FX-SR	M-FX-SR
100Base-TX (copper only)	M-TX
10GBase-1310-MMF	1310-MMF
10GBase-CX4	XG-CX4
10GBase-ER	XG-ER
10GBase-LR	XG-LR
10GBase-SR	XG-SR
10GBase-ZR	XG-ZR
10GBase-ZRD	XG-ZRD

Port regions

Ports on *FastIron X Series* chassis devices are grouped into regions. For a few features, such as port monitoring and unknown unicast configurations, you will need to know the region to which a port belongs. However, for most features, a port region does not affect configuration or operation of the feature. If a port region does affect configuration or operation of a feature, it is noted and described in the appropriate feature section of this guide.

- FSX 800 and FSX 1600 management module with 2-port 10-GbE: (two port regions)
  - Port 1 belongs to port region 0
  - Port 2 belongs to port region 1
- FSX 800 and FSX 1600 management module with 8-port GbE copper and fiber ports (one port region)
  - Ports 1 – 8 belong to port region 0

- 48-port 10/100/1000 Mpbs Ethernet PoE interface module (two port regions)
  - Ports 1 - 24 belong to port region 0
  - Ports 25 - 48 belong to port region 1
- 24-port Gigabit Ethernet copper interface module (two port regions)
  - Ports 1 – 12 belong to port region 0
  - Ports 13 – 24 belong to port region 1
- 24-port Gigabit Ethernet fiber interface module (two port regions)
  - Ports 1 – 12 belong to port region 0
  - Ports 13 – 24 belong to port region 1
- 2-port 10-Gigabit Ethernet fiber interface module (two port regions)
  - Port 1 belongs to port region 0
  - Port 2 belongs to port region 1
- 8-port 10-Gigabit Ethernet interface module (two port regions)
  - Ports 1 - 4 belong to port region 0
  - Ports 5 - 8 belong to port region 1

Power supplies

FastIron X Series chassis devices ship with one or two power supplies, depending on how they are ordered from the factory.

- The FSX 800 comes with one 12-volt AC power supply. You can install up to four power supplies.
- The FSX 1600 comes with two 12-volt AC power supplies. You can install up to eight power supplies; four 12-volt AC or DC supplies and four 52- 54 volt AC power supplies for PoE and PoE+.

You can use any combination of the supported AC and DC supplies in the same device.

The following information applies to PoE power supplies:

- The SX-ACPWR2500-PoE requires 220-volt input.
- Because the SX-ACPWR2500-PoE powers up to 146 class 3 PoE ports, the SX-ACPWR-PoE is not sufficient as a backup power supply.

Figure 17 lists the power supplies supported for the *FastIron X Series* chassis devices.

TABLE 17 Power supplies supported for the FastIron X Series devices

Sales Model Number	Description[1]	FSX 800	FSX 1600
SX-ACPWR-SYS	12-volt AC replacement power supply, manufacturing part number 32014-*xxx*[2]	Supported	Supported
	12-volt AC original power supply, manufacturing part number 30351-*xxx*[2]	Supported	Supported

TABLE 17 Power supplies supported for the FastIron X Series devices

Sales Model Number	Description[1]	FSX 800	FSX 1600
SX-ACPWR-PoE	52-54 -volt AC replacement power supply, manufacturing part number 32016-*xxx*[2]	Supported[3]	Supported[3]
	52- 54-volt AC original power supply, manufacturing part number 30352-*xxx*[2]	Supported[3]	Supported[3]
SX-DCPWR-SYS	52- 54-volt DC	Supported	Supported
SX-DCPWR-PoE	52- 54-volt DC	Supported[3]	Supported[3]
SX-ACPWR2500-PoE	52- 54-volt AC (220-volt input only)	Supported[3]	Supported[3]

1. For the differences between replacement and original power supplies, refer to "Replacement power supplies" on page 31.
2. Manufacturing part numbers are inscribed on the labels on the top of the power supply.
3. FSX 800 and FSX 1600 devices automatically perform a PoE power upgrade allowing 48-volt power supplies to support a maximum 54-volts. Refer to "Dynamic upgrade of PoE power supplies" in the *FastIron Configuration Guide*.

The following power supplies can be installed in the *FastIron X Series* chassis devices:

- Non-PoE devices:
  - The 12-volt AC and DC power supplies (also called system (SYS) power supplies) provide power to one management module and up to eight non-PoE interface modules. In the FSX 800, you can install a second 12-volt power supply for redundancy. The FSX 1600 comes with and requires two 12-volt power supplies and supports up to four 12-volt power supplies for redundancy.
- PoE devices:

NOTE
FWS and FESX devices and SX-FI424P and SX-624P modules continue to support only PoE and 802.3af applications. All other FastIron PoE-compliant devices also support PoE+ and 802.3at applications.

  - The 12-volt AC and DC power supplies (also called system (SYS) power supplies) provide power to the management module, all non-PoE interface modules (if applicable), and all ports on PoE modules that do not require PoE power or to which no power-consuming devices are attached. In the FSX 800, you can install a second 12-volt power supply for redundancy. The FSX 1600 comes with and requires two 12-volt power supplies and supports up to four 12-volt power supplies for redundancy.
  - The 52- 54-volt PoE power supplies provide power to the PoE daughter card, and ultimately to PoE power-consuming devices. The number of PoE power-consuming devices that one 52- 54-volt power supply can support depends on the number of watts required by each power-consuming device. Each 52- 54-volt power supply can provide a maximum of 1080

watts of PoE power, and each PoE port supports a maximum of 15.4 watts of power per PoE power-consuming device. For example, if each PoE power-consuming device attached to the Brocade device consumes 15.4 watts of power, one 52- 54-volt supply will power up to 70 PoE ports. You can install a second 52-54-volt supply for additional PoE power.

- The 52- 54-volt (220-volt input only) PoE power supplies provide power to the PoE daughter card, and ultimately to PoE power-consuming devices. The number of PoE power-consuming devices that one 220-volt power supply can support depends on the number of watts required by each power-consuming device. Each 220-volt power supply can provide a maximum of 2260 watts of PoE power, and each PoE port supports a maximum of 15.4 watts of power per PoE power-consuming device. For example, if each PoE power-consuming device attached to the Brocade device consumes 15.4 watts of power, one 220-volt supply will power up to 146 PoE ports. You can install a second 220-volt supply for additional PoE power.

NOTE
The system activates as many PoE ports as the 52- 54-volt PoE power supplies can handle. The system calculates the maximum number of PoE ports it can support based on the number of PoE power supplies installed. PoE ports are enabled based on their priority settings. The system reserves the maximum configured power per PoE-enabled port, even if the PoE power-consuming device is drawing less power.

- PoE+ devices:

NOTE
SX-FI424P and SX-624P modules do not support PoE+ and 802.3at applications.

  - The 12-volt AC and DC power supplies (also called system (SYS) power supplies) provide power to the management module, all non-PoE interface modules (if applicable), and all ports on PoE+ modules that do not require PoE power or to which no power-consuming devices are attached. In the FSX 800, you can install a second 12-volt power supply for redundancy. The FSX 1600 comes with and requires two 12-volt power supplies and supports up to four 12-volt power supplies for redundancy.
  - The 52- 54-volt PoE+ power supplies provide power to the PoE+ daughter card, and ultimately to PoE+ power-consuming devices. The number of PoE+ power-consuming devices that one 52- 54-volt power supply can support depends on the number of watts required by each power-consuming device. Each 52- 54-volt power supply can provide a maximum of 1080 watts of PoE power, and each PoE+ port supports a maximum of 30 watts of power per PoE+ power-consuming device. For example, if each PoE+ power-consuming device attached to the Brocade device consumes 30 watts of power, one 52- 54-volt supply will power up to 36 PoE+ ports. You can install a second 52- 54-volt supply for additional PoE+ power.
  - The 52- 54-volt (220-volt input only) PoE+ power supplies provide power to the PoE+ daughter card, and ultimately to PoE+ power-consuming devices. The number of PoE+ power-consuming devices that one 220-volt power supply can support depends on the number of watts required by each power-consuming device. Each 220-volt power supply can provide a maximum of 2260 watts of PoE+ power, and each PoE+ port supports a maximum of 30 watts of power per PoE+ power-consuming device. For example, if each PoE+ power-consuming device attached to the Brocade device consumes 30 watts of power, one 220-volt supply will power up to 75 PoE+ ports. You can install a second 220-volt supply for additional PoE+ power.

NOTE
The system activates as many PoE+ ports as the 52- 54-volt PoE power supplies can handle. The system calculates the maximum number of PoE+ ports it can support based on the number of PoE+ power supplies installed. PoE+ ports are enabled based on their priority settings. The system reserves the maximum configured power per PoE+ enabled port, even if the PoE+ power-consuming device is drawing less power.

CAUTION

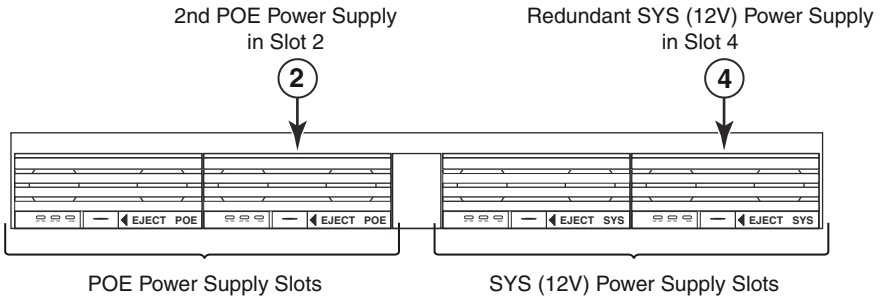
The PoE+ power supply is designed exclusively for use with the *FastIron X Series* PoE+ chassis devices. The power supply produces extensive power to support 802.3at applications. Installing the power supply in a device other than the *FastIron X Series* PoE device will cause extensive damage to your equipment.

All power supplies are auto-sensing and auto-switching.

Power supplies are installed in the slots along the bottom of the device.

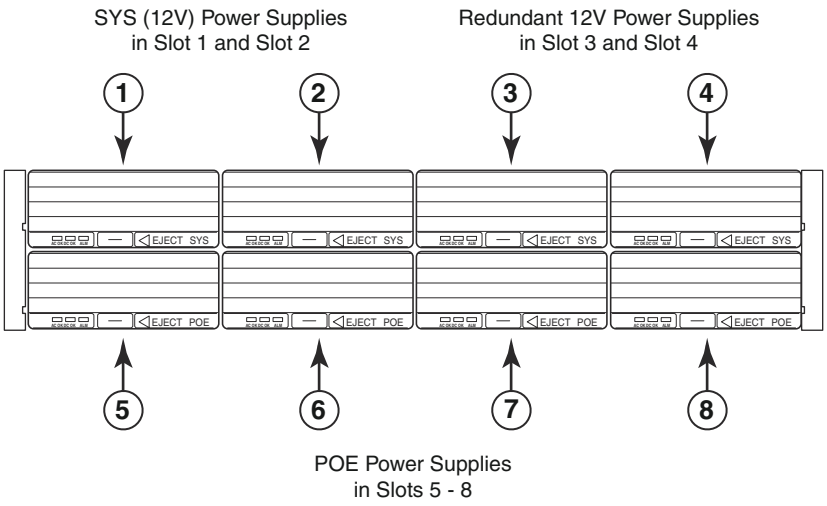
In FSX 800 devices, the 12-volt (system) power supplies occupy slot numbers 3 and 4 on the right, with the redundant supply in slot 4. PoE power supplies occupy slot numbers 1 and 2 on the left. Figure 20 shows power supply placement.

FIGURE 20 Power supply placement in the FSX 800



In the FSX 1600 device, the system power supplies occupy slot numbers 1 – 4 in the top row with the redundant supplies in slot numbers 3 and 4. The PoE power supplies occupy slot numbers 5 – 8 in the bottom row. Figure 21 shows power supply placement.

FIGURE 21 Power supply placement in the FSX 1600



Installed power supplies provide power to all device components, sharing the workload equally. If a power supply fails or overheats, the workload for the failed power supply is redistributed to the redundant power supply, if one is present.

Power supplies are hot swappable, which means you can remove and replace them without powering down the system. You can remove and insert a power supply without opening the device. If the device contains redundant 12-volt power supplies, you can remove one of the power supplies without interrupting operation. The remaining power supply provides enough power for all the ports. For more information about removing and installing the power supplies, refer to "Installing or replacing a power supply" on page 122.

DANGER

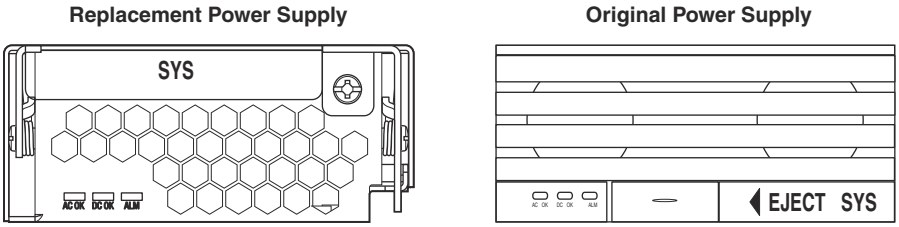
The power supplies are hot swappable, which means they can be removed and replaced while the device is powered on and running. However, it is recommended that you always disconnect the power supply from the wall outlet before removing and replacing the supply. The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the power supply or other parts of the device could be damaged.

Replacement power supplies

Replacement power supplies for the SX-ACPWR-SYS and SX-ACPWR-PoE are functionally equivalent to the original power supplies, and can be used in combination with the original power supplies in the same device. Although the model numbers for both the newer and older versions of the power supplies are identical, the front panels and the manufacturing part numbers are different.

Figure 22 shows a side-by-side comparison of the SX-ACPWR-SYS replacement power supply and the original power supply.

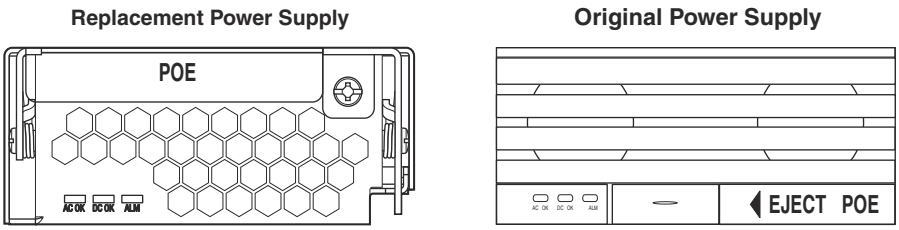
FIGURE 22 SX-ACPWR-SYS replacement and original power supplies



SX-ACPWR-SYS (part number 32014-xxx) SX-ACPWR-SYS (part number 30351-xxx)

Figure 23 shows a side-by-side comparison of the SX-ACPWR-PoE replacement power supply and the original power supply.

FIGURE 23 SX-ACPWR-PoE replacement and original power supplies



SX-ACPWR-POE (part number 32016-xxx) SX-ACPWR-POE (part number 30352-xxx)

Figure 24 shows a side view of the replacement power supplies.

FIGURE 24 Replacement power supply side view

The latching mechanism on the front of the replacement power supplies differ from the latching mechanism on the original power supplies. The latching mechanism protrudes slightly in front, making the power supplies slightly longer in depth. For the actual dimensions, refer to "Physical dimensions and weight" on page 153.

Although the model numbers (SX-ACPWR-SYS and SX-ACPWR-PoE) for the replacement and original power supplies are identical, the manufacturing part numbers are different. The manufacturing part numbers are inscribed on the labels affixed to the top of the power supplies. In addition, the manufacturing part numbers for all installed power supplies are displayed in the output of the **show chassis** command. Refer to "Overview" on page 77.

Hardware specifications for the power supplies are in the Chapter 7, "Hardware Specifications".

Power supply LEDs

Each power supply has three LEDs on the faceplate. The LEDs are described in Table 18.

TABLE 18 Power supply LEDs

LED	Desired State	Meaning	Abnormal State	Meaning or Action
AC OK (AC supply only)	ON – Green (steady)	The power supply is receiving AC power from an AC power source	OFF	The power supply is not receiving power from an AC power source. You can do the following: • Make sure that the power supply cord is connected securely to the wall outlet and the power supply. • Make sure that the wall outlet is rated for 115/120V and 20A. If it is not, obtain a cable that is compatibly rated for the outlet. • Make sure that the wall outlet has power.
DC IN (DC supply only)	Green (steady)	The power supply is receiving DC power from a DC power source	OFF	The power supply is not receiving power from a DC power source. You can do the following: • Make sure that the power supply cables are connected securely to the power source and the power supply. • Make sure that the DC power source is 48VDC @ 37.0 A. • Make sure that the power source has power.
DC OUT	ON – Green (steady)	The power supply is supplying DC output power to the device	OFF	The power supply is not supplying DC output power to the device. If this occurs and the AC OK (AC power supply) or DC IN (DC power supply) LED is Green, then there is a problem with the power supply and it must be replaced.
ALM	OFF	No alarms present and the power supply is in normal operating condition.	Amber	There is an alarm present and the power supply is malfunctioning. Verify the AC or DC input and DC output voltages.

About redundant power supplies and power supply failure

A FastIron device with redundant power supplies can maintain full operation when one or more power supplies fail. Power supply failure can be a failure of the supply itself or the office power grid connected to the power supply.

A FastIron device can be either 1 + 1 redundant or N + 1 redundant. ***1 + 1 redundancy*** implies that for every power supply, there is another redundant (backup) power supply. In other words, half of the supplies in the system can fail, and the system will still operate normally. ***N + 1 redundancy*** implies that there is one redundant power supply for N power supplies, where N is a number greater than one. For example, 3 + 1 redundancy means that in a system with four power supplies, the system will continue to operate normally if one power supply fails, but will not operate if more than one power supplies fail.

Power consumption is equally distributed (within a certain percentage depending on power load or power supply type) among all power supplies in the system. When a power supply fails, the power load is redistributed equally among the remaining power supplies. Power consumption between PoE and system power supplies is not shared, meaning loss of a system power supply does not impact a PoE power supply, and vice versa.

When one or more system power supplies fail

If one or more system power supplies fail and the system is left with less than the minimum number of power supplies required for normal operation, the power supplies will go into overload and the system will start to shut down. Several things can happen. The output voltage of the remaining good power supplies will likely drop as they try unsuccessfully to generate more power than they are capable of. The system will react to a drop in voltage by increasing the current draw. The hardware will shut down due to over-current protection or under-voltage protection, whichever takes place first. One by one, the interface modules will shut down until the power is within the power budget of the remaining power supplies. There is no particular order in which the interface modules will shut down, as this will occur in hardware and not in software. The management CPU requires power as well, and may also shut down during a power supply failure.

After a power loss, if the system is left with less than the minimum number of power supplies required for normal operation, the system will be left in an unknown state. At this point, manual recovery is required (i.e. restore power and power cycle the device).

When one or more PoE power supplies fail

If one or more PoE power supplies fail and the system is left with less than the minimum number of PoE power supplies, the PoE power supplies will go into overload. Non-PoE functions will not be impacted, provided the System power supplies are still up and running. Several things can happen with a PoE power supply failure. The output voltage of the remaining good power supplies will likely drop as they try unsuccessfully to generate more power than they are capable of. The system will react to a drop in voltage by increasing the current draw. The hardware will shut down PoE function due to over-current protection or under-voltage protection, whichever occurs first. The interface modules will start to shut down its PoE ports one by one until the over-power is within the power budget of the remaining power supplies. There is no particular order in which the PoE ports will shut down, as this occurs in hardware and not in software.

After a power loss, if the system is left with less than the minimum number of power supplies required for normal operation, the system will be left in an unknown state. At this point, manual recovery is required (i.e. restore power and power cycle the device).

Cooling system

The cooling system is contained within the system fan tray assembly and modules. The following components comprise the cooling system:

- The FSX and FSX 800 each have six four-speed fans.

- The FSX 1600 has two five-speed fans in the rear of the device.
- One fan control module. The fan control module maintains the power to the fans, and controls the fan speed and the reporting of the fan status to the management module.
- Two temperature sensors on each management module, and one temperature sensor on each interface module
- One temperature sensor on each switch fabric module.

The fan tray in the FSX and FSX 800 device is located in the right side of the chassis. The FSX 1600 has two fan trays which are located in the top rear of the chassis.

Upon system startup, the fans operate at low speed, then adjust their speed based on the current temperature of the modules and the configured temperature thresholds, or by the manually configured fan speed.

By default, the system polls the temperature sensor on each module every 60 seconds to get a temperature reading. For information about changing the default temperature polling interval, refer to "Changing the temperature polling interval" on page 87. Depending on the temperature readings for the modules, the system can do the following:

- Leave the fan speed as is
- Increase the fan speed
- Decrease the fan speed

If the device exceeds the highest temperature threshold or shutdown temperature for five minutes, the system will shut down the device to prevent damage

If the temperature of a module exceeds specified high temperature thresholds, the system generates a Syslog message. The system can also power down the device if the temperature exceeds the highest threshold.

You can change default low and high temperature thresholds for modules and fan speeds. For more information, refer to "Changing temperature thresholds for thermal planes and fan speeds" on page 84.

The device ships with all fan components fully installed in the fan tray. For information about replacing the fan tray, refer to one of the following sections:

- "Replacing the FSX 800 fan tray" on page 137
- "Replacing the FSX 1600 fan assemblies" on page 139

Built-in mounting brackets

The front of each FSX and FSX 800 device has built-in mounting brackets that enable you to front-mount the device in a standard 19-inch (EIA310-D) rack. For instructions about using the built-in mounting brackets to mount the device in a rack, refer to "Installing the chassis in a rack" on page 42.

Alternatively, you can use a rack mount kit (ordered separately) to center-mount the FSX and FSX 800 using two L-shaped mounting brackets. The rack mount kit comes with instructions for installing the mounting brackets and mounting the device in a rack.

The FSX 1600 does not have built-in mounting brackets. Two brackets ship with the FSX 1600 that enable you to front-mount or center-mount the device in a rack.

Contact Brocade Communications, Inc. for information about rack mount kits.

Layer 3 routing protocol table sizes

Use the **show default values** command to display Layer 3 routing protocol table sizes. The command output shows the default, maximum, and currently configured values. Refer to the *FastIron Configuration Guide* for an example output.

Chapter

Installing FastIron SX Devices

2

This chapter describes how to install your FastIron SX devices.

DANGER

The procedures in this manual are for qualified service personnel.

NOTE

Information about configuring IP addresses and connecting a FastIron SX chassis device to other network devices is covered in the Chapter 3, "Connecting Network Devices and Checking Connectivity".

Unpacking the system

FastIron SX devices ship with the following items. Review this list and verify the contents:

NOTE

If any items are missing, contact the place of purchase.

- FastIron SX chassis with the following components installed:
  - One or two 12-volt power supplies
  - Fan tray assembly or assemblies
  - Slot panels installed in all unoccupied slots
  - Two switch fabric modules installed
- Rack Mount Kit (FSX 1600 models only)
- Management module or modules (packaged separately)
- Optional interface modules (packaged separately)
- Warranty card
- A 115V AC power cable for each AC power supply you purchase from Brocade

DANGER

If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

Installation precautions

Follow these precautions when installing the chassis.

General precautions

DANGER

All fiber-optic interfaces use Class 1 Lasers.

CAUTION

Do not install the device in an environment where the operating ambient temperature might exceed 40° C (104° F).

CAUTION

Make sure the air flow around the front, sides, and back of the device is not restricted.

CAUTION

If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

CAUTION

Never leave tools inside the chassis.

Lifting precautions

DANGER

A fully populated chassis is heavy. TWO OR MORE PEOPLE ARE REQUIRED WHEN LIFTING, HANDLING, OR MOUNTING THESE DEVICES.

DANGER

Make sure the rack or cabinet housing the device is adequately secured to prevent it from becoming unstable or falling over.

DANGER

Mount the devices you install in a rack or cabinet as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.

Power precautions and warnings

DANGER

The power supplies are hot swappable, which means they can be removed and replaced while the chassis is powered on and running. However, Brocade recommends that you disconnect the power supply from the wall outlet before removing and replacing the supply. The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the power supply or other parts of the device could be damaged.

DANGER

If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

DANGER

Make sure to choose the appropriate circuit device depending on the number of AC power supplies installed in the chassis. The minimum current draw for the system is one AC power supply.

DANGER

Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.

DANGER

Disconnect the power cord from all power sources to completely remove power from the device.

CAUTION

Do not install the device in an environment where the operating ambient temperature might exceed 40° C (104° F).

CAUTION

All devices with DC power supplies are intended for installation in restricted access areas only. A restricted access area is where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

CAUTION

For a DC system, use a grounding wire of at least 6 American Wire Gauge (AWG). The 6 AWG wire should be attached to an agency-approved crimp connector crimped with the proper tool. The crimp connector should allow for securement to both ground screws on the enclosure. For the Ground lug, use UL listed Panduit crimp connector, P/N LCD6-10A, and two 10-32, PPH, screws to secure crimp connector to chassis. The grounding position is located on the side of the chassis adjacent to the ground symbol.

CAUTION

For the DC input circuit to the system, make sure there is a 30 amp circuit breaker, minimum -48Vdc, double pole, on the input to the terminal block. The input wiring for connection to the product should be Listed copper wire, 8 AWG, marked VW-1, and rated minimum 90 degrees Celsius.

CAUTION

All devices with AC power sources are intended for installation in restricted access areas only. A restricted access area is a location where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security.

CAUTION

For a Brocade AC system, use a ground wire of at least 6 American Wire Gauge (AWG). The ground wire should have an agency-approved crimped connector (provided with the chassis) attached to one end, with the other end attached to building ground. The connector must be crimped with the proper tool, allowing it to be connected to both ground screws on the enclosure.

CAUTION

Use a separate branch circuit for each AC power cord, which provides redundancy in case one of the circuits fails.

CAUTION

The POE power supply is designed exclusively for use with the *FastIron X Series* POE devices. The power supply produces extensive power to support 802.3af applications. Installing the power supply in a device other than the *FastIron X Series* POE will cause extensive damage to your equipment. Use a separate branch circuit for each AC power cord, which provides redundancy in case one of the circuits fails.

CAUTION

Ensure that the device does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add the ampere (amp) ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the input power connectors.

CAUTION

Make sure the power supply is properly inserted in the slot. Never insert the power supply upside down.

CAUTION

Do not attempt to install the power supply without first opening the latch on the front of the power supply. Attempting to install the power supply with a closed latch will result in mechanical damage to the power supply and power supply slot.

Preparing the installation site

Cabling infrastructure

NOTE

Ensure that the proper cabling is installed in the site. For information on cabling, refer to the following sections in this guide:

- "Attaching a management station" on page 51
- "Connecting network devices" on page 70
- "Cable specifications" on page 151

Installation location

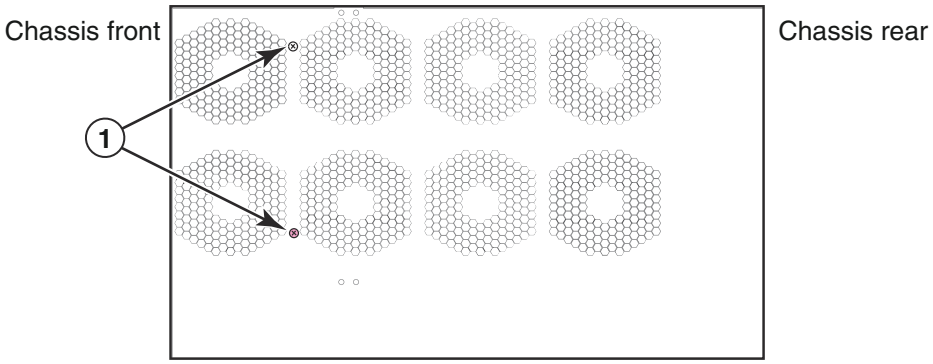
Before installing the device, plan the location and orientation relative to other devices and equipment. Allow at least three inches of space at the front of the device for the fiber-optic and power cabling. Also, allow a minimum of three inches of space between the sides and the back of the device and walls or other obstructions.

Removing extra shipment screws (FSX 800 only)

The FSX 800 ships with two extra screws installed in the right side of the chassis. These screws secure the fan tray, protecting it from damage during shipment. You must remove these screws before installing the chassis. Figure 25 shows the location of the screws.

To perform this task, you need a #2 Phillips-head screwdriver.

FIGURE 25 Removing the extra screws used for shipment



1 Shipping screws

Installing the chassis in a rack

Because of the weight of a fully loaded chassis (97 lbs minimum), it is recommended that you mount your device in a rack before installing the modules and power supplies.

In a standard 19-inch (EIA310-D) rack, you can install up to seven FSX 800 devices, or up to three FSX 1600 devices. You can flush-mount the FSX 800 using the built-in mounting brackets on the front of the device. Alternatively, you can use the optional rack mount kit to center-mount the chassis in a rack. The FSX 1600 does not have built-in mounting brackets. To mount the FSX 1600 in a rack, you will need to install the brackets in the rack mount kit that ships with the chassis, as shown in figure Figure 28.

Before performing this task, you should have an assembled rack and a #2 Phillips-head screwdriver.

Keep the following in mind when mounting a chassis in a rack.

DANGER

The devices are very heavy, especially when fully populated with modules and power supplies. TWO OR MORE PEOPLE ARE REQUIRED WHEN LIFTING, HANDLING, OR MOUNTING THESE DEVICES.

DANGER

Make sure the rack or cabinet housing the device is adequately secured to prevent it from becoming unstable or falling over.

DANGER

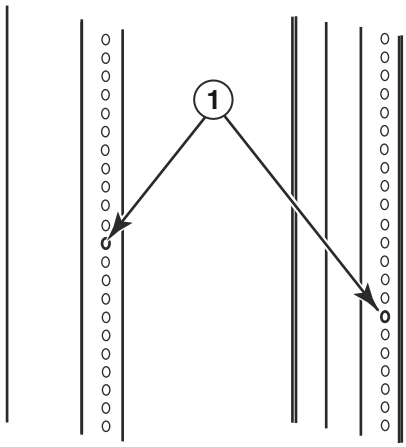
Mount the devices you install in a rack or cabinet as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.

For each FastIron X Series that you install in a rack, you must provide four mounting screws with which to secure the chassis.

To mount the chassis in a rack using the built-in mounting brackets, perform the following tasks.

1. Determine the position of each chassis in the rack.
2. Position two of the four mounting screws for each chassis that you plan to mount in the rack according to the spacings of the keyhole slots on the brackets (as shown in Figure). Do not secure the screws completely; leave approximately 1/4 inch of clearance between the back of the screw head and the rack.

FIGURE 26 Positioning two or four mounting screws in a rack.

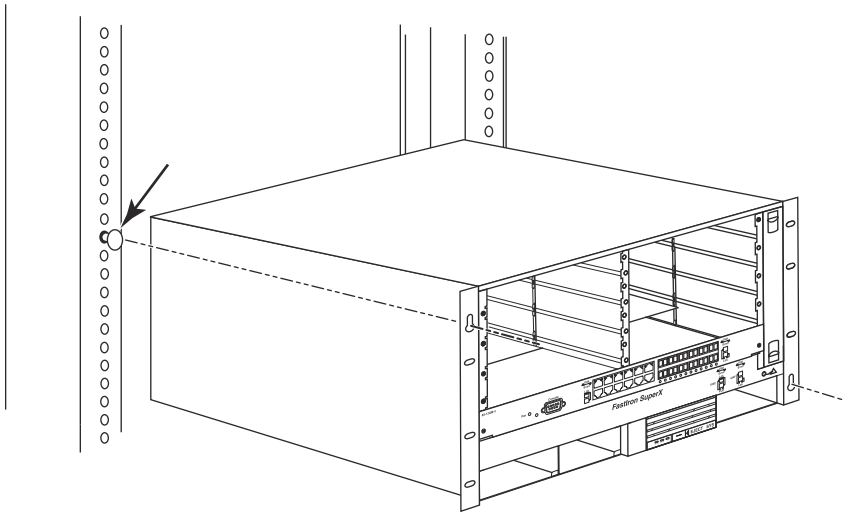

1
Select holes in rack that match the keyholes in mounting brackets (in this case, the top for the left-hand bracket and the bottom for the right-hand bracket)

Positioning two of four mounting screws in a rack

1 Keyhole slots

3. Start by mounting the chassis that goes in the lowest position in the rack, as shown in Figure 27. With two or more people lifting the chassis, slip the wide portion of each keyhole slot over the corresponding screw in the rack.

FIGURE 27 Mounting a chassis in a rack - front mount

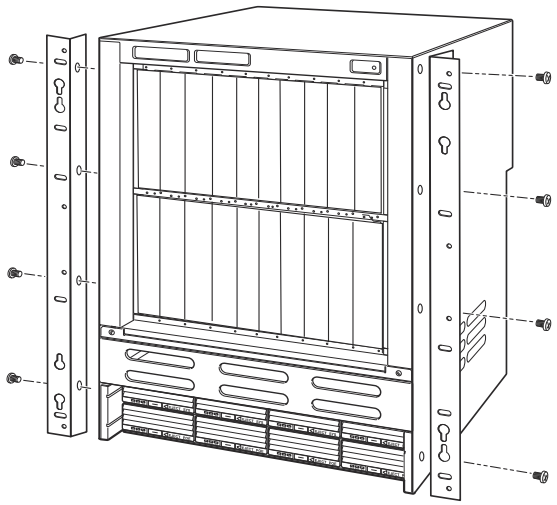


4. Slide the chassis down so that the screw heads are in the narrow portion of the keyhole slots.
5. Install the remaining two mounting screws through the opposite corners of the brackets into the rack.
6. Tighten all screws to secure the chassis in place.
7. Repeat step 3 through step 6 to mount each subsequent chassis in the same rack.

Installing mounting brackets on the FSX 1600 chassis

The FSX 1600 chassis does not ship with mounting brackets installed. You will need to install the brackets, using a #2 Phillips or flathead screwdriver. Mount the brackets as shown in Figure 28. Since the brackets are identical, you must rotate one bracket 90 degrees to fit on the opposite side from the first bracket.

FIGURE 28 Installing the mounting brackets on an FSX 1600 chassis.



Empty chassis with slot panels in place

Repeat step 3 through step 6 to install the FSX 1600 chassis in the rack.

Removing the slot panels

The chassis ships with a slot panel installed in each empty module slot, ensuring proper airflow within the chassis. If you plan to install a module in a particular slot, you must first remove the slot panel.

CAUTION

If you do not install a module in a slot, you must keep the slot panel in place. If you operate the chassis with an uncovered slot, the system will overheat.

Although the slot panels may differ in size, the procedure for removing them is the same. The procedure in this section applies to all module slot panels.

You need a #2 Phillips-head or flathead screwdriver to perform this task.

To remove a slot panel, complete the following tasks.

1. Loosen the screws on either end of the slot panel with a #2 Phillips-head or flathead screwdriver.
2. Pull the slot panel out of the chassis and store it in a safe place for future use.

Installing management and interface modules

This section provides the procedures for installing management and interface modules. Although the modules may differ in size and function, the procedure for installing them in the chassis is the same, with the exception of the NI-MLX-. The procedure described in this section applies to all FastIron X Series devices.

FSX 800 and FSX 1600 management modules are hot swappable, which means you can remove and insert them while the chassis is powered on and running.

NOTE
Management modules are dedicated, which means you must install them in the appropriate device.

NOTE
Interface modules (except the 48-port 10/100/1000 Mbps Ethernet POE interface module and SX-FI24GPP and SX-FI48GPP modules) are interchangeable among all FastIron X Series devices. However, if you install them in a Brocade device other than a FastIron X Series device, the device and interface modules will not function properly.

You cannot mix IPv4 and IPv6 modules together in the same chassis.

Because 48-port 10/100/1000 Mbps Ethernet POE+ interface modules (SX-FI48GPP) occupy two vertical half-slots in the FastIron SX 800 or 1600 device, they can be installed in certain slots only. Refer to Table 19.

Table 19 shows the slot numbers into which you must install management and interface modules. The following figures show the chassis with slot numbers:

- FSX 800 – Figure 2 on page 6
- FSX 1600 – Figure 4 on page 9

TABLE 19 Slot numbers for module installation

Module	FSX 800 Slot Numbers	FSX 1600 Slot Numbers
Management module	9 and 10	9 and 10
Interface modules (except for 48-port POE+)	1 – 8	1 – 8 and 11 – 18
48-port POE+ interface modules (SX-FI48GPP)	Module fills 2 slots. Install as follows: - Install in slot 3, fills slots 1 and 3 - Install in slot 4, fills slots 2 and 4 - Install in slot 7, fills slots 5 and 7 - Install in slot 8, fills slots 6 and 8	Module fills 2 slots. Install as follows: - Install in slot 1, fills slots 1 and 3 - Install in slot 2, fills slots 2 and 4 - Install in slot 5, fills slots 5 and 7 - Install in slot 6, fills slots 6 and 8 - install in slot 11, fills slots 11 and 13 - install in slot 12, fills slots 12 and 14 - install in slot 15, fills slots 15 and 17 - install in slot 16, fills slots 16 and 18

CAUTION

If you do not install a module in a slot, you must leave the slot panel installed in the slot. If you operate the chassis with an uncovered empty slot, the system will overheat.

Before installing a module in the chassis, have the following on hand:

- A # Phillips-head or flathead screwdriver.
- An ESD wrist strap with a plug for connection to the ESD connector on the chassis.

DANGER

For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

To install a module in the chassis, complete the following tasks.

NOTE
You do not need to power down FSX 800 and FSX 1600 devices when installing management modules. You can install modules in the FSX 800 and FSX 1600 chassis while it is powered on and running.

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located on the chassis front panel.
2. Remove the module from the packaging.
3. Insert the management module or interface module into the appropriate slot and slide the card along the card guide until the ejector levers rotate towards the module front panel.

   NOTE
   If you are installing SX-FI48GPP POE+ interface modules, refer to Table 19 for the slot numbers where these modules may be installed. Each module occupies the equivalent of two slots, so plan your installation accordingly. Refer to Figure 33 on page 50 and Figure 34 on page 50.

4. Fold the ejectors towards the center of the module to fully seat the module in the backplane.
5. Use the #2 Phillips-head or flathead screwdriver to tighten the screws on each side of the module faceplate.

The following illustrations show placement of management and interface modules in a FastIron X Series device.

FIGURE 29 Installing a management module in the FSX 800 chassis.

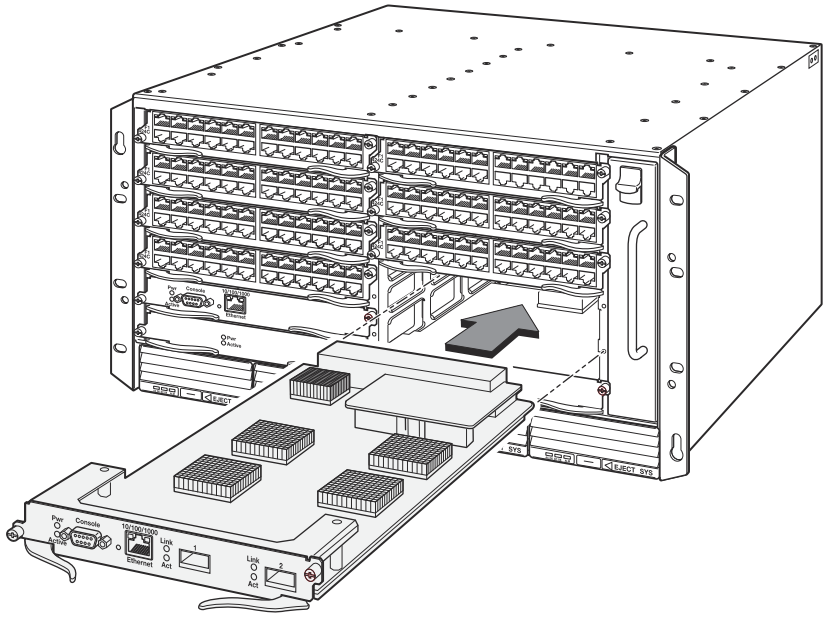


FIGURE 30 Installing a management module in the FSX 1600 chassis.

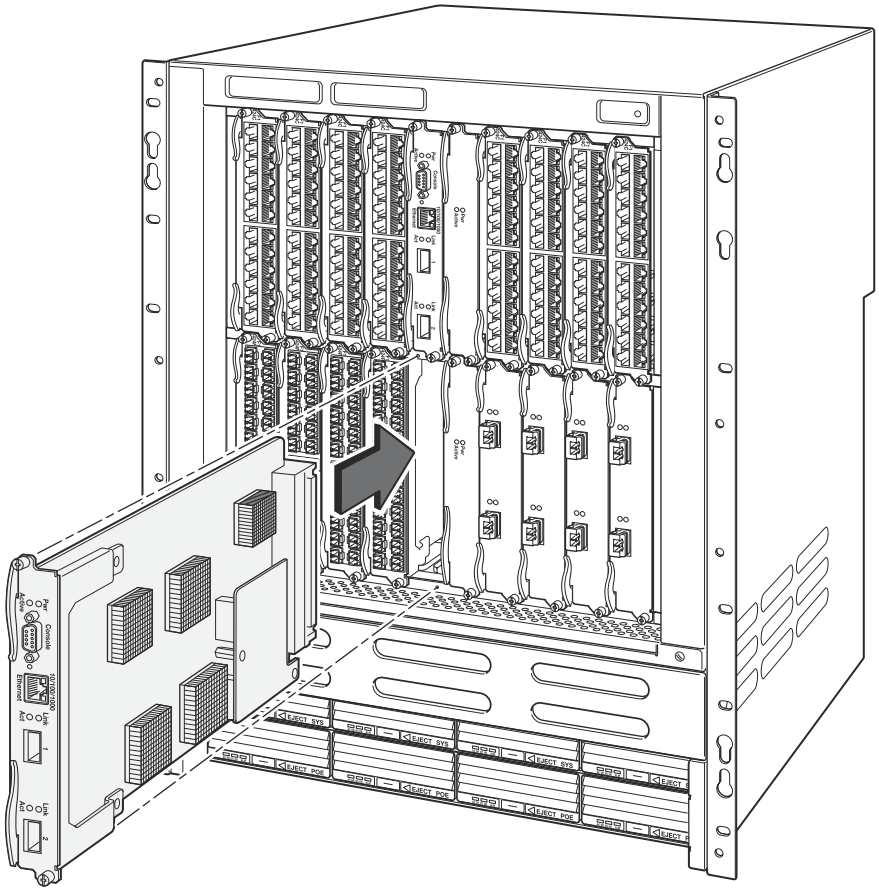


FIGURE 31 Installing an interface module in the FSX 800 chassis.

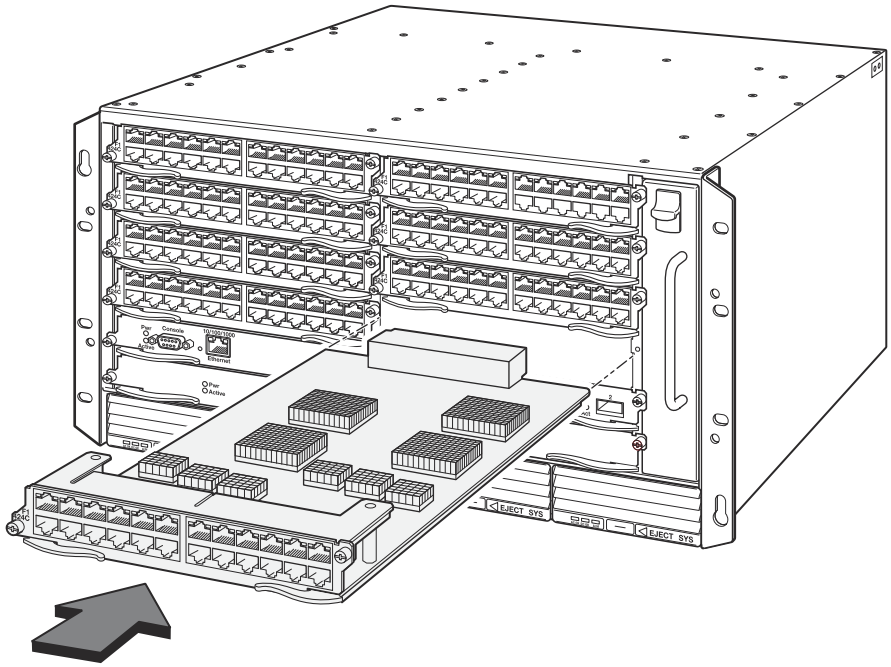


FIGURE 32 Installing an interface module in the FSX 1600 chassis.

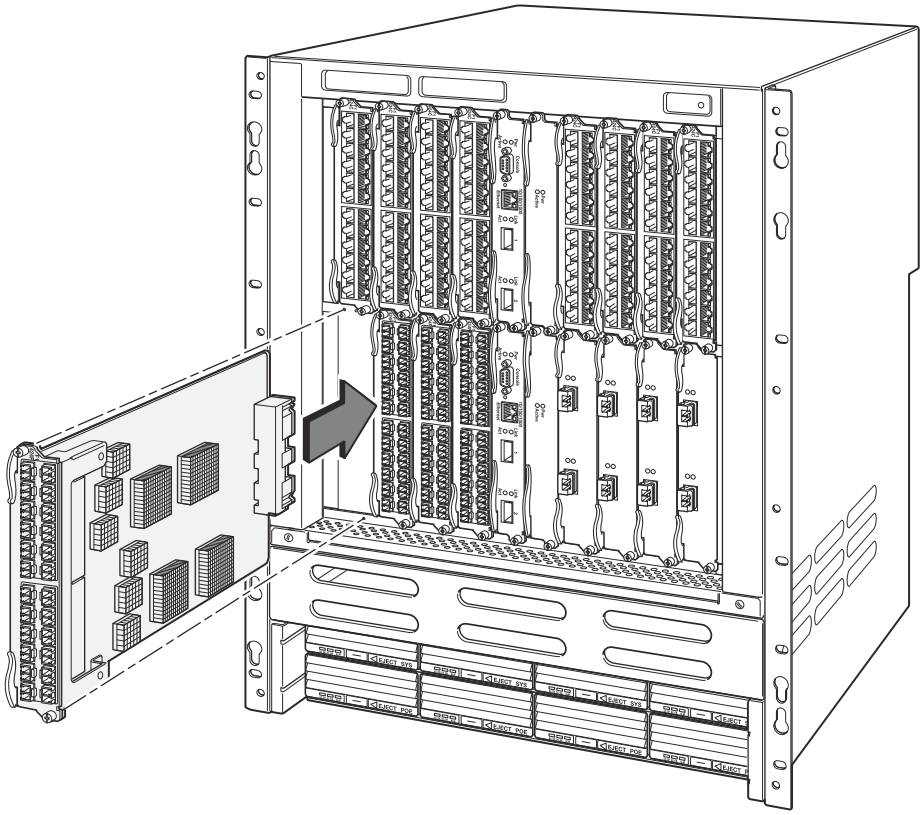


FIGURE 33 **Installing an** SX-FI48GPP POE+ interface module in an FSX 800 device

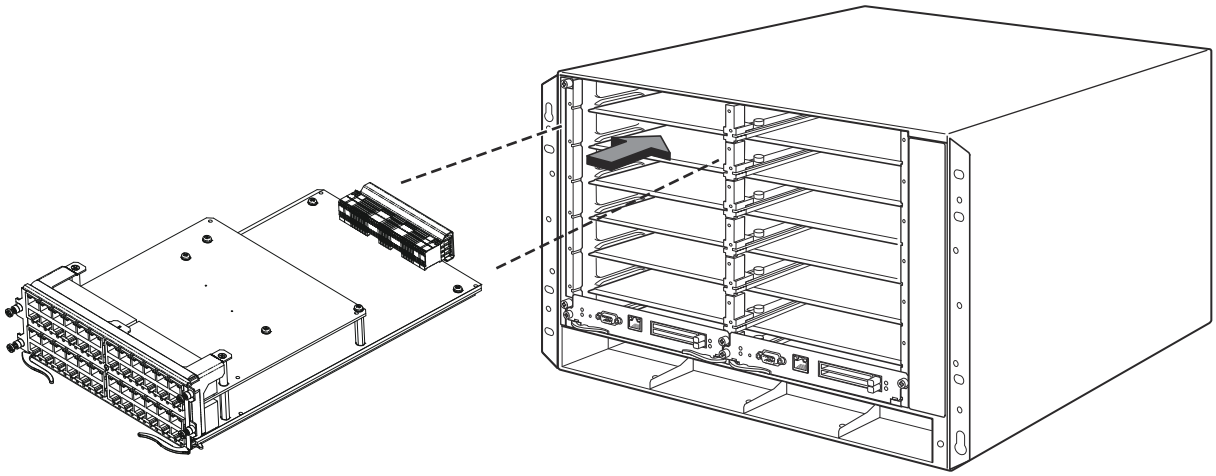
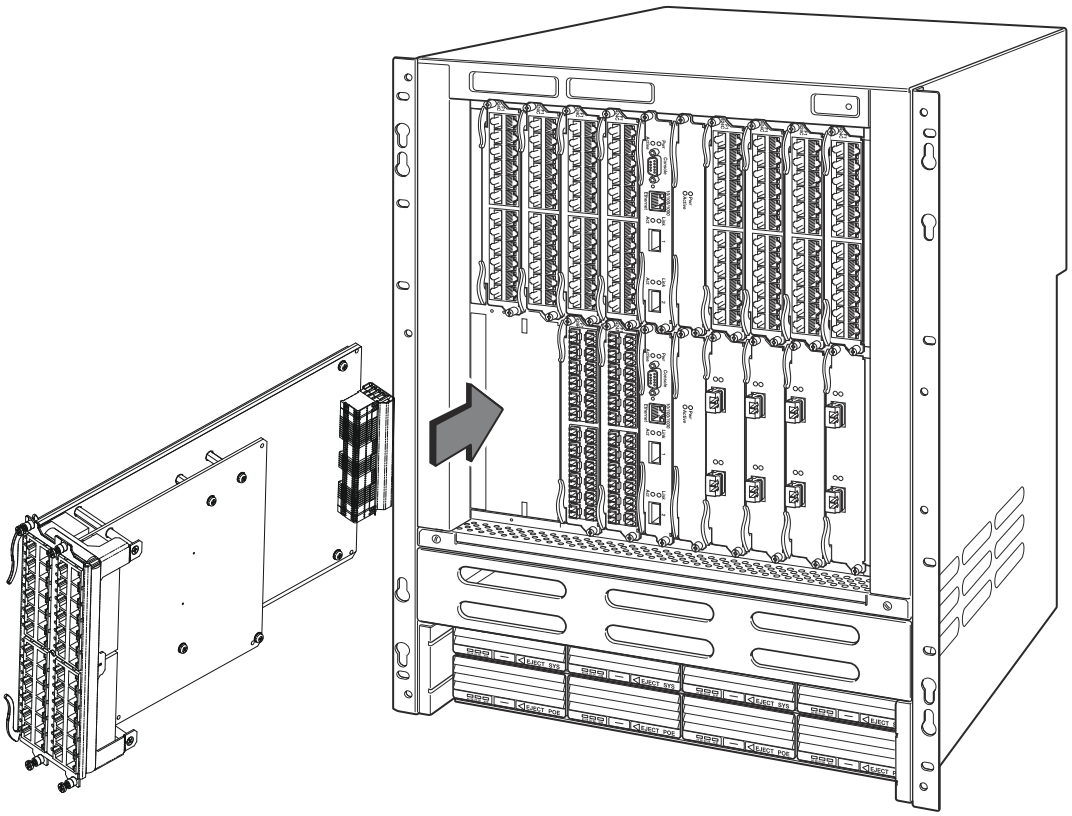


FIGURE 34 **Installing an** SX-FI48GPP POE+ interface module in an FSX 1600 device



Attaching a management station

You can manage the FastIron X Series system in the following ways:

- Connect a PC or terminal to the serial (Console) port or 10/100/1000 Ethernet port on the management module and access the system directly or through a Telnet connection to the PC or terminal. Refer to "Attaching a PC or terminal to the console port or 10/100/1000 copper port" on page 51.
- Connect the FastIron X Series switch to your existing management network and manage the switch, along with other network devices, from a management station. To do this, you can connect a switch to a Gigabit Ethernet port on the management module. Refer to "Attaching a switch to an Ethernet port" on page 52.

NOTE
The management network into which you can connect a Gigabit Ethernet port must be separate and isolated from the network over which user packets are switched and routed.

Attaching a PC or terminal to the console port or 10/100/1000 copper port

The Console port on the management module has a male DB-9 serial connector, and 10/100/1000 Ethernet copper port or ports have RJ45 UTP connectors, which allow you to attach a PC or terminal. From the Console port, you can access the system command line interface (CLI) directly from the PC or terminal or through a Telnet connection. From the Ethernet port, you can access the CLI or Web Management Interface directly or through a Telnet connection to the PC or terminal.

Before performing this task, you need the following items:

- A PC running a terminal emulation application or a terminal.
- To connect the PC or terminal to the Console port, you need a straight-through EIA or TIA DB-9 serial cable with one end terminated in a female DB-9 connector and the other end terminated in a male or female DB-9 or DB-25 connector, depending on the specifications of your PC or terminal. You can order the serial cable separately from Brocade Communications, Inc. or build your own cable. If you prefer to build your own cable, refer to the pinout information in "Serial (console) port pinouts" on page 149.
- To connect the PC or terminal to a Gigabit Ethernet copper port, you need a category 5 UTP crossover cable, which you must supply. For information about the port pin assignments, refer to "10/100 and gigabit port pinouts" on page 150.

To attach a PC or terminal to the Console port or Gigabit Ethernet copper port, complete the following tasks.

1. Connect a PC or terminal to the Console port or a 10/100/1000 Ethernet port using the appropriate cable.
2. Open the terminal emulation program, and set the session parameters as follows:
   - Baud: 9600 bps
   - Data bits: 8
   - Parity: None
   - Stop bits: 1

- Flow control: None

Attaching a switch to an Ethernet port

The 10/100/1000 Ethernet copper ports on the FSX 800 and FSX 1600 management module and the combination Gigabit Ethernet copper and fiber ports on the FSX management module allow you to attach a networking switch. A management station in your existing management network can then access the Brocade switch using the *Brocade Network Advisor*.

For more information, refer to "Connecting network devices" on page 70.

Powering on the system

After you complete the hardware installation, you can power on the system. Verify that all modules and power supplies are fully and properly installed and no module slots are uncovered.

Note the following precautions before powering on the system.

CAUTION

If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

DANGER

If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

NOTE

If the wall outlet is not rated 115 or 120V and 20A, stop and get the appropriate cable for the outlet. Make sure you obtain a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

NOTE

The wall outlet should be installed near the equipment and should be easily accessible.

NOTE

The FastIron X Series switch is designed to provide uninterrupted service even when you insert or remove the interface modules. Therefore, the system does not have a separate on or off power switch. To turn the system off, simply unplug the power cords.

DANGER

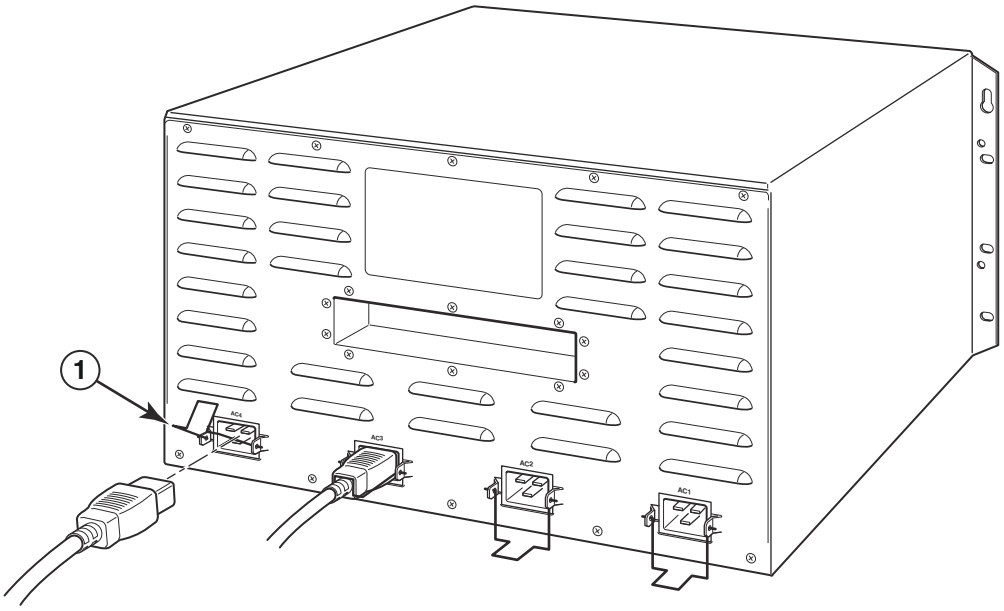
High Touch Current. Earth connection essential before connecting supply.

Connecting AC power to the chassis

AC power is supplied though an AC power cord that is connected to the back of the chassis. Perform the following tasks to connect AC power to the chassis.

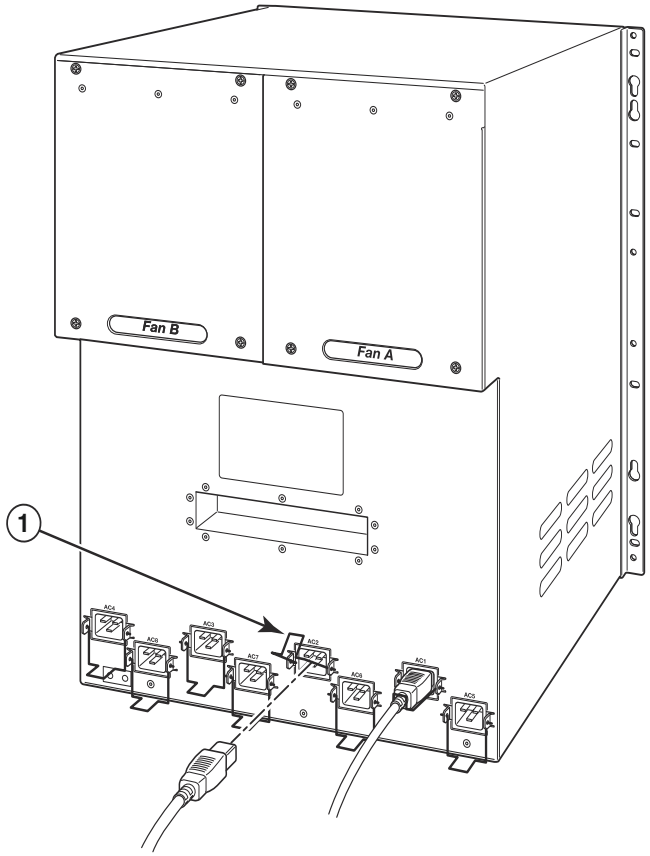
1. At the rear of the chassis, locate the power receptacles on the power supplies.
2. Lift the cord-retainer and connect a Brocade-supplied AC power cord to the power supply.
3. Snap the cord-retainer over the power plug to hold it in place, as illustrated in Figure 35.

FIGURE 35 Connecting the AC power cord on an FSX 800 device



1 Cord retainer

FIGURE 36 Connecting the AC power cord on an FSX 1600 device.



1 Cord retainer

DANGER

If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

4. Connect the power cord to the wall outlet.
5. Observe the LEDs on the power supply front panel. The AC OK and DC OK LEDs should be green (steady), which indicates the power supply is providing power to the components. If it is amber or OFF, the power supply is not providing power to the components. The ALM LED should be OFF.

Connecting DC power to the chassis

You can use a DC power source for the Brocade chassis using a DC-to-DC power supply. DC power must be supplied at 48 V and 30 A.

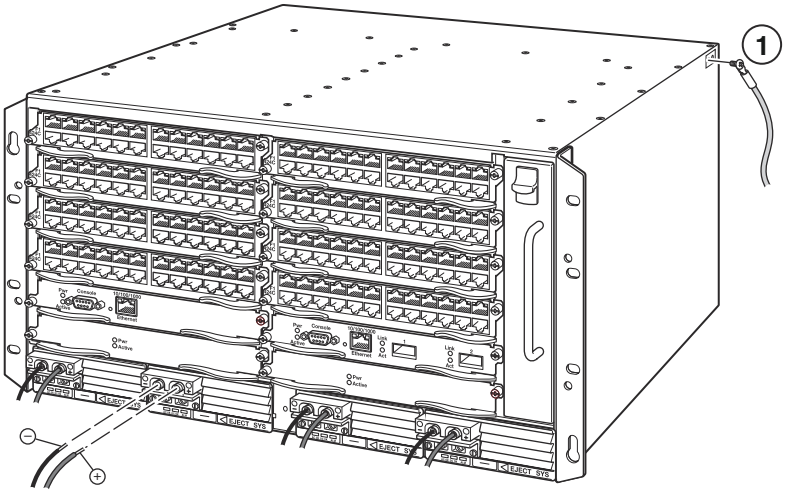
To perform this task, you need the following items:

- Flathead screwdriver
- Phillips-head screwdriver
- #6 AWG wire (grounding wire)
- #8 AWG wire (input wire)
- Crimping tool

To connect a DC power source, complete the following tasks.

1. Crimp #6 AWG ground wire and connect it to the ground position on the chassis. The ground position is located on the side or rear of the chassis next to the ground symbol. Refer to Figure 37.

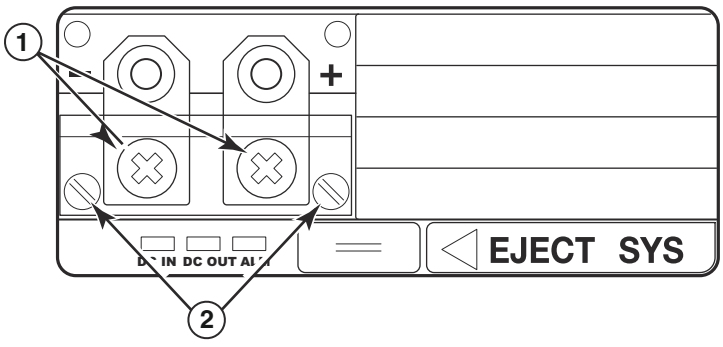
FIGURE 37 Chassis ground on FXS 800 device.



1 Ground

2. Use a flathead screwdriver to remove the two screws holding the transparent cover over the power supply lugs. Figure 38 shows the location of the screws and lugs.

FIGURE 38 Power lugs and cover screws

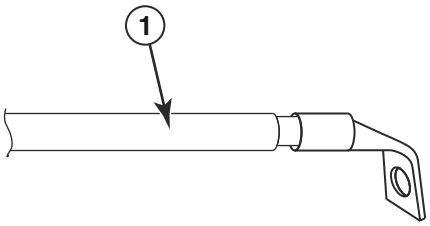


1 Screws holding power lugs

2 Screws holding transparent cover

3. Use a Phillips-head screwdriver to remove the power lugs. Refer to Figure 4 and Figure 40.
4. Crimp #8 AWG input wire into the power lugs and reconnect the lugs to the power supply unit. Refer to Figure 40.

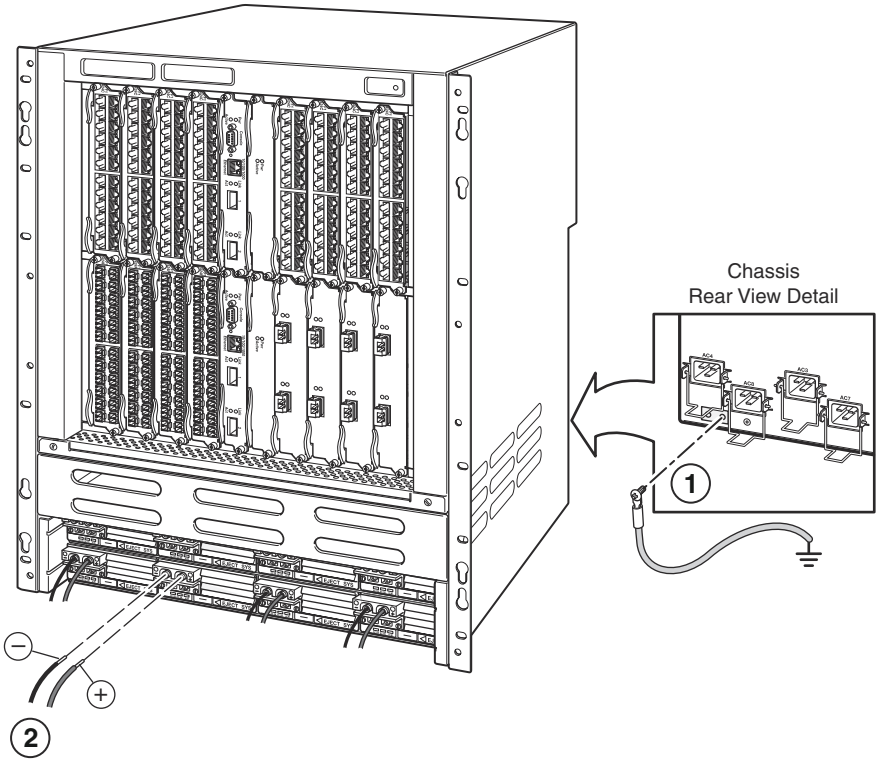
FIGURE 39 Power supply wire



1 #8 AWG power supply wire

This equipment installation must meet NEC/CEC code requirements. Consult local authorities for regulations.

FIGURE 40 Reconnect lugs to power supply.



1 Ground

2 DC power

5. Re-attach the transparent cover that you removed in step 1.
6. Connect the positive and negative supply wires to the correct locations on your DC power source, as marked on the power supply.
7. Observe the LEDs on the power supply front panel. The DC IN and DC OUT LEDs should be green (steady), which indicates the power supply is providing power to the components. If it is amber or OFF, the power supply is not providing power to the components. The ALM LED should be OFF.

Verifying proper operation

To verify the proper operation of the chassis after the power is on, you can:

- Observe the LEDs
- Display the module (component) status using the CLI

Observing the LEDs

When the FastIron X Series device is receiving power, you can observe the LEDs to verify that the device initialized successfully. Table 20 describes the LEDs, the desired state of each LED, possible abnormal states of each LED, and what to do if an LED indicates an abnormal state.

TABLE 20 Desired and abnormal LED states after system power-on.

LED	Desired State	Meaning	Abnormal State	Meaning or Action
Management module				
Active	On	The module is functioning as the active management module.	Off	Neither management module or is managing the switch fabric and interface modules. A problem may have occurred during initialization. Check your PC or terminal for possible error messages.
Pwr	On	The module is receiving power.	Off	The module is not receiving power. You can do the following: • Make certain that the module is installed properly. For more information, refer to "Installing management and interface modules" on page 46. • If using AC power supplies, refer to the entry for the AC power supply LED in this table for more information.

TABLE 20 Desired and abnormal LED states after system power-on. (Continued)

LED	Desired State	Meaning	Abnormal State	Meaning or Action
10/100/1000 Ethernet Port	On – Green	A link is established with the remote port.	Off	A link is not established with the remote port. You can do the following: • Verify that the connection to the other device has been properly made. Also, make certain that the other device is powered on and operating correctly. • Try using a different cable.
10/100/1000 Ethernet Port	On or blinking – Yellow	The port is transmitting and receiving packets.	Off for an extended period	The port is not transmitting or receiving packets. You can check the other 10/100/1000 Ethernet port LED to make sure a link is established with the remote port. If not, take the actions described in the Meaning or Action column for the other 10/100/1000 Ethernet port LED.
Interface Module				
Link or Activity	On or blinking	A link is established with the remote port and the port is transmitting and receiving user packets.	Off	At this stage of the installation, you have not yet cabled the Gigabit Ethernet ports, so this LED will be off. After cabling this port, if this LED is off, a link is not established with the remote port.
POE (if applicable)	On – Green	The port is enabled, a power-consuming device has been detected, and the module is supplying power to the device.	Off	The port is not providing in-line power.
AC and DC Power Supplies				
AC OK (AC supply only)	ON – Green (steady)	The power supply is receiving AC power from an AC power source	OFF	The power supply is not receiving power from an AC power source. You can do the following: • Make sure that the power supply cord is connected securely to the wall outlet and the power supply. • Make sure that the wall outlet is rated for 115 or 120V and 20A. If it is not, obtain a cable that is compatibly rated for the outlet. • Make sure that the wall outlet has power.

TABLE 20 Desired and abnormal LED states after system power-on. (Continued)

LED	Desired State	Meaning	Abnormal State	Meaning or Action
DC IN (DC supply only)	Green (steady)	The power supply is receiving DC power from a DC power source	OFF	The power supply is not receiving power from a DC power source. You can do the following: • Make sure that the power supply cables are connected securely to the power source and the power supply. • Make sure that the DC power source is 48VDC @ 30 A. • Make sure that the power source has power.
DC OUT	ON – Green (steady)	The power supply is supplying DC output power to the chassis	OFF	The power supply is not supplying DC output power to the chassis. If this occurs and the AC OK (AC power supply) or DC IN (DC power supply) LED is Green, then there is a problem with the power supply and it must be replaced.
ALM	OFF	No alarms present and the power supply is in normal operating condition.	Amber	There is an alarm present and the power supply is malfunctioning. Verify the AC or DC input and DC output voltages.

If a problem persists after taking action described in this table, contact Brocade's technical support.

Displaying the module status

After you have attached a PC or terminal to the management module's Console port or Ethernet port and the Brocade device has initialized successfully, press **Enter** to display the following CLI prompt in the terminal emulation window.

```
FastIron>
```

If you do not see this prompt, complete the following steps.

1. Make sure the cable is securely connected to your PC or terminal and the Console port or Ethernet port.
2. Check the settings in your terminal emulation program. In addition to the session settings listed in "Attaching a PC or terminal to the console port or 10/100/1000 copper port" on page 51, make sure the terminal emulation session is running on the same serial port you attached to the Console port.

If you view the prompt `FastIron>` or similar, you are connected to the system and can display the status of the modules using the CLI. Enter the **show module** command at any CLI level.

The following shows the output of the **show module** command when entered on the FSX 800. The display output is similar on the FSX 1600.

```
Brocade# show module
     Module                                Status    Ports Starting MAC
  F1: SX-FISF Switch Fabric                 active
  F2: SX-FISF Switch Fabric                 active
  S1: SX-F424C 24-port Gig Copper           OK          24   00e0.beef.0000
  S2: SX-F424C 24-port Gig Copper           OK          24   00e0.beef.0000
  S3: SX-F42XGW 2-port 10G LAN/WAN          OK           2   00e0.beef.0030
  S4: SX-F424C 24-port Gig Copper           OK          24   00e0.beef.0048
  S5: SX-F42XGW 2-port 10G LAN/WAN          OK           2   00e0.beef.0060
  S6: SX-F424C 24-port Gig Copper           OK          24   00e0.beef.0078
  S7: SX-F424C 24-port Gig Copper           OK          24   00e0.beef.0090
  S8: SX-F424F 24-port Gig Fiber            OK          24   00e0.beef.00a8
  S9: SX-FIZMR4 0-port Management           Active       0
     { Status : OK }
 S10: SX-FIZMR4 0-port Management           Standby      0
     { Status : Absent }
```

Syntax: show module

The Status column shows the module status. The status can be one of the following:

- OK – The module is up and running
- ACTIVE – This applies to the FSX 800 and FSX 1600 management and switch fabric modules only. This indicates that the module is the active module as opposed to the standby module.
- UNACTIVE -- This status indicates a lost connection, failed initialization, or failed power. Take the module out and reinsert to continue.
- STANDBY – This applies to the FSX 800 and FSX 1600 management and switch fabric modules only. This indicates that the module is the standby module as opposed to the active module.
- FAILED – The management module was unable to bring up an interface module properly. If you observe this status, make certain that the interface module is installed properly. For more information, refer to "Installing management and interface modules" on page 46.
- DISABLED – The module is not up and running.

Chapter

Connecting Network Devices and Checking Connectivity 3

Overview

This chapter provides the details for connecting network devices and checking network connectivity.

DANGER

The procedures in this manual are for qualified service personnel.

Table 21 lists the tasks you must perform to connect your Brocade device, and how to troubleshoot any problems that can arise.

TABLE 21 Network connectivity tasks

Step	Task	Page
1	Secure access to the CLI by assigning passwords.	page 63
2	Configure IP addresses for the management, Ethernet, virtual, and loopback interfaces.	page 65
3	Connect your device to another networking device.	page 70
4	Observe certain LEDs to determine if the network connections are functioning properly. Also test a port for connectivity to other networking devices using the **ping** and **traceroute** commands.	page 74
5	Troubleshoot any problems that can arise.	page 75

Assigning permanent passwords

By default, the CLI is not protected by passwords. To secure CLI access, It is strongly recommended that you assign passwords.

NOTE
You cannot assign a password using the Web Management Interface. You can assign passwords using the *Brocade Network Advisor* software if an enable password for a Super User has been configured on the device.

The CLI contains the following access levels:

- **User EXEC** – The level you enter when you first start a CLI session. At this level, you can view some system information but you cannot configure system or port parameters.
- **Privileged EXEC** – This level is also called the Enable level and can be secured by a password. You can perform tasks such as manage files on the flash module, save the system configuration to flash, and clear caches at this level.

- **CONFIG** – The configuration level. This level lets you configure the system's IP address and configure switching and routing features. To access the CONFIG mode, you must already be logged into the Privileged level of the EXEC mode.

You can set the following levels of Enable passwords:

- **Super User** – Allows complete read-and-write access to the system. This is generally for system administrators and is the only password level that allows you to configure passwords.

NOTE
You must set a super user password before you can set other types of passwords.

- **Port Configuration** – Allows read-and-write access for specific ports but not for global (system-wide) parameters.
- **Read Only** – Allows access to the Privileged EXEC mode and CONFIG mode but only with read access.

To set passwords, complete the following steps.

1. At the opening CLI prompt, enter the following command to change to the Privileged level of the EXEC mode.

```
Brocade> enable
```

2. Access the CONFIG level of the CLI by entering the following command.

```
Brocade# configure terminal
Brocade(config)#
```

3. Enter the following command to set the super-user password.

```
Brocade(config)# enable super-user-password <text>
```

NOTE
You must set the super-user password before you can set other types of passwords.

4. Enter the following commands to set the port configuration and read-only passwords.

```
Brocade(config)# enable port-config-password <text>
Brocade(config)# enable read-only-password <text>
```

NOTE
If you forget your super-user password, refer to "Recovering from a lost password" on page 64.

Syntax: **enable super-user-password** <*text*> | **read-only-password** <*text*>| **port-config-password** <*text*>

Password <*text*> can be up to 32 characters long.

Recovering from a lost password

By default, the CLI does not require passwords. However, if someone has configured a password for the device but the password has been lost, you can regain super-user access to the device using the following procedure.

NOTE
Recovery from a lost password requires direct access to the serial port and a system reset.

To recover from a lost password, complete the following steps.

1. Start a CLI session over the serial interface to the Brocade device.
2. Reboot the device.
3. While the system is booting, before the initial system prompt appears, enter **b** to enter the boot monitor mode.
4. Enter **no password** at the prompt. (You cannot abbreviate this command.)
5. Enter **boot system flash primary** at the prompt. This command causes the device to bypass the system password check.
6. After the console prompt reappears, assign a new password.

Configuring IP addresses

You must configure at least one IP address using the serial connection to the CLI before you can manage the system using the other management interfaces. In addition, Brocade routers require an IP subnet address for the subnet in which you plan to place them in your network.

IPv4 devices

Brocade IPv4 devices support both classical IP network masks (Class A, B, and C subnet masks, and so on) and Classless Interdomain Routing (CIDR) network prefix masks:

- To enter a classical network mask, enter the mask in IP address format. For example, enter "209.157.22.99 255.255.255.0" for an IP address with a Class-C subnet mask.
- To enter a prefix number for a network mask, enter a forward slash (/) and the number of bits in the mask immediately after the IP address. For example, enter "209.157.22.99/24" for an IP address that has a network mask with 24 significant ("mask") bits.

By default, the CLI displays network masks in classical IP address format (example: 255.255.255.0). You can change the display to the prefix format. Refer to the *FastIron Configuration Guide* for more information.

IPv4 devices running layer 3 software

Before attaching equipment to a Brocade router, you must assign an interface IP address to the subnet on which the router will be located. You must use the serial connection to assign the first IP address. For subsequent addresses, you also can use the CLI through Telnet or the Web Management Interface.

By default, you can configure up to 24 IP interfaces on each port, virtual interface, and loopback interface. You can increase this amount to up to 64 IP subnet addresses per port by increasing the size of the subnet-per-interface table. Refer to the *FastIron Configuration Guide* for more information.

The following procedure shows how to add an IPv4 address and mask to a router port.

1. At the opening CLI prompt, enter **enable**.

```
Brocade> enable
```

2. Enter the following command at the CLI Privileged EXEC level prompt, then press **Enter**. This command erases the factory test configuration if still present.

```
Brocade# erase startup-config
```

CAUTION

Use the erase startup-config command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the write memory command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command.

   Privileged EXEC Level.

```
Brocade# configure terminal
```

   Global CONFIG Level.

```
Brocade(config)#
```

4. Configure the IPv4 address and mask address for the interface.

```
Brocade(config)# int e 1/5
Brocade(config-if-e1000-1/5)# ip address 192.22.3.44 255.255.255.0
```

NOTE
You can use the syntax **ip address** <ip-addr>/<mask-bits> if you know the subnet mask length. In the above example, you could enter **ip address** 192.22.3.44/24.

Syntax: enable [<*password*>]

Syntax: configure terminal

Syntax: [**no**] **ip address** <*ip-addr*> <*ip-mask*> [**secondary**]

or

Syntax: [**no**] **ip address** <*ip-addr*>/<*mask-bits*> [**secondary**]

Use the **secondary** parameter if you have already configured an IP address within the same subnet on the interface.

IPv4 devices running Layer 2 software

To configure an IPv4 address to a device running Layer 2 software, complete the following tasks.

1. At the opening CLI prompt, enter **enable**.

```
Brocade> enable
```

2. Enter the following command at the Privileged EXEC level prompt (for example, Brocade#), then press **Enter**. This command erases the factory test configuration if still present.

```
Brocade# erase startup-config
```

CAUTION

Use the erase startup-config command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the write memory command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command.

   Privileged EXEC Level.

```
Brocade# configure terminal
```

   Global CONFIG Level.

```
Brocade(config)#
```

4. Configure the IPv4 address and mask for the switch.

```
Brocade(config)# ip address 192.22.3.44 255.255.255.0
```

5. Set a default gateway address for the switch.

```
Brocade(config)# ip default-gateway 192.22.3.1
```

NOTE
You do not need to assign a default gateway address for single subnet networks.

Syntax: enable [<*password*>]

Syntax: configure terminal

Syntax: [**no**] **ip address** <*ip-addr*> <*ip-mask*>

or

Syntax: [**no**] ip address <*ip-addr*>/<*mask-bits*>

Syntax: ip default-gateway <*ip-addr*>

IPv6 devices

Brocade IPv6 devices support the 128-bit addressing format, composed of 8 fields of 16-bit hexadecimal values separated by colons (:). For example, 2001:0000:0000:0200:002D:D0FF:FE48:4672 is an IPv6 address, which can also be expressed as 2001:0:0:200:2D:D0FF:FE48:4672 after omitting the leading zeros.

IPv6 devices running layer 3 software

Before attaching equipment to a Brocade router, you must assign an interface IP address to the subnet on which the router will be located. You must use the serial connection to assign the first IP address. For subsequent addresses, you also can use the CLI through Telnet or the Web Management Interface.

By default, you can configure up to 24 IP interfaces on each port, virtual interface, and loopback interface. You can increase this amount to up to 64 IP subnet addresses per port by increasing the size of the subnet-per-interface table. Refer to the *FastIron Configuration Guide* for more information.

The following procedure shows how to add an IPv6 address and mask to a router port.

1. At the opening CLI prompt, enter **enable**.

```
Brocade> enable
```

2. Enter the following command at the CLI Privileged EXEC level prompt, then press **Enter**. This command erases the factory test configuration if still present.

```
Brocade# erase startup-config
```

CAUTION

Use the erase startup-config command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the write memory command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command.

   Privileged EXEC Level

```
Brocade# configure terminal
```

   Global CONFIG Level

```
Brocade(config)#
```

4. Configure the IPv6 address and mask address for the interface.

```
Brocade(config)# int e 1/5
Brocade(config-if-e1000-1/5)# ipv6 address
2001:200:12D:1300:240:D0FF:FE48:4672:/64
```

These commands configure the global prefix 2001:200:12d:1300::/64 and the interface ID::240:D0FF:FE48:4672, and enable IPv6 on interface e 1/5.

NOTE

The above procedure shows how to configure an IPv6 address with a manually configured Interface ID as the address for the interface. You could also configure an IPv6 address with an automatically computed EUI-64 Interface ID as the address for the interface. Link-local IPv6 addresses are also supported. For details, refer to the *FastIron Configuration Guide*.

Syntax: enable [<*password*>]

Syntax: configure terminal

Syntax: [**no**] **ipv6 address** <*ipv6-prefix*>/<*prefix-length*>

You must specify the <ipv6-prefix> parameter in hexadecimal using 16-bit values between colons as documented in RFC 2373.

You must specify the <prefix-length> parameter in decimal value. A slash mark (/) must follow the <ipv6-prefix> parameter and precede the <prefix-length> parameter.

IPv6 devices running Layer 2 software

To configure an IPv6 address to a device running Layer 2 software, complete the following tasks.

1. At the opening CLI prompt, enter **enable**.

```
Brocade> enable
```

2. Enter the following command at the Privileged EXEC level prompt (for example, `FastIron#`), then press **Enter**. This command erases the factory test configuration if still present.

```
Brocade# erase startup-config
```

CAUTION

Use the erase startup-config command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the write memory command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command.

   Privileged EXEC Level.

```
Brocade# configure terminal
```

   Global CONFIG Level.

```
Brocade(config)#
```

4. Configure the IP address and mask for the switch.

```
Brocade(config)# ipv6 address 2001:200:12D:1300:240:D0FF:FE48:4000:1/64
```

NOTE

The above procedure shows how to configure an IPv6 address with a manually configured interface ID as the system-wide address for the switch. You could also configure an IPv6 address with an automatically computed EUI-64 interface ID as the system-wide address for the switch. A link-local IPv6 address is also supported. For details, refer to the *FastIron Configuration Guide*.

Syntax: enable [<*password*>]

Syntax: configure terminal

Syntax: [**no**] **ipv6 address** <*ipv6-prefix*>**/**<*prefix-length*>

You must specify the <*ipv6-prefix*> variable in hexadecimal using 16-bit values between colons as documented in RFC 2373.

You must specify the <*prefix-length*> variable in decimal value. A slash mark (/) must follow the <*ipv6-prefix*> variable and precede the <*prefix-length*> variable.

Connecting network devices

Brocade devices support connections to other vendors' routers, switches, and hubs, as well other Brocade devices.

Cable specifications

Refer to "Cable specifications" on page 151 for cable lengths and types.

Connecting to Ethernet or fast Ethernet hubs

For copper connections to Ethernet hubs, a 10/100Base-TX or 1000Base-T switch, or another Brocade device, a crossover cable is required (Figure 41 and Figure 42). If the hub is equipped with an uplink port, it will require a straight-through cable instead of a crossover cable.

NOTE
The 802.3ab standard (automatic MDI or MDIX detection) calls for automatic negotiation of the connection between two 1000Base-T ports. Therefore, a crossover cable may not be required; a straight-through cable may work as well. For more information about this feature, refer to the *FastIron Configuration Guide*.

FIGURE 41 UTP crossover cable

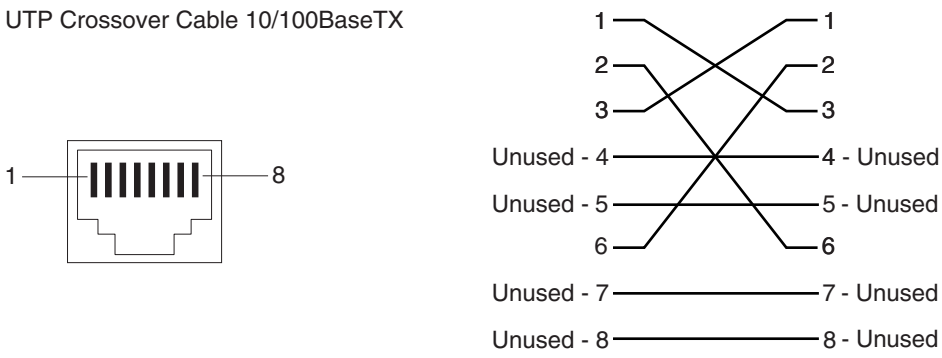
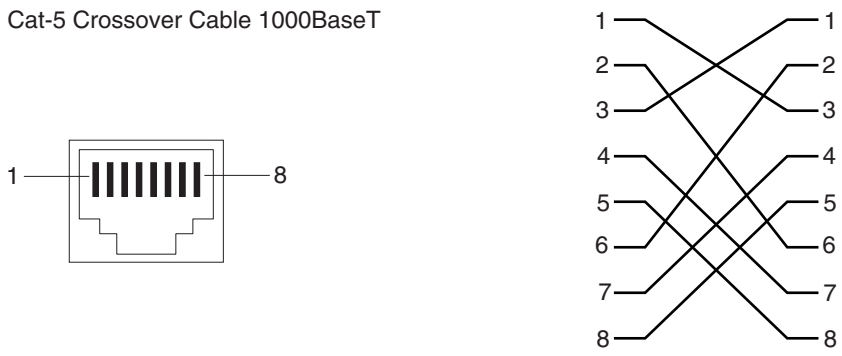


FIGURE 42 Cat-5 crossover cable for 1000Base-T



NOTE
The 802.3ab standard calls for automatic negotiation of the connection between two 1000Base-T ports. Consequently, a crossover cable may not be required; a straight-through cable may work as well.

Connecting to workstations, servers, or routers

Straight-through UTP cabling is required for direct UTP attachment to workstations, servers, or routers using network interface cards (NICs).

Fiber cabling with LC connectors is required for direct attachment to Gigabit NICs or switches and routers.

NOTE
The 802.3ab standard (automatic MDI or MDIX detection) calls for automatic negotiation of the connection between two 1000Base-T ports. Therefore, a crossover cable may not be required; a straight-through cable may work as well. For more information about this feature, refer to the *FastIron Configuration Guide*.

Connecting a network device to a fiber port on the Brocade device

For direct attachment from the Brocade device to a Gigabit NIC, switch, or router, fiber cabling with an LC connector is required.

NOTE
All physical IP interfaces on *FastIron X Series* Layer 3 devices share the same MAC address. For this reason, if more than one connection is made between two devices, one of which is a FastIron X Series Layer 3 device, Brocade recommends the use of virtual interfaces. It is not recommended to connect two or more physical IP interfaces between two routers.

To connect a Brocade device to another network device using a fiber port, you must do the following:

- Install a fiber optic module (SFP transceiver or mini-GBIC for Gigabit Ethernet ports, or XFP-MSA or SFP+ MSA transceiver for 10-Gigabit Ethernet ports)

- Cable the fiber optic module

The following sections provide information about performing these tasks.

Installing a fiber optic module

You must install a fiber optic module in each Gigabit Ethernet and 10-Gigabit Ethernet fiber port you want to use.

DANGER

All fiber-optic interfaces use Class 1 Lasers.

NOTE

Refer to "Installation precautions" on page 38 for other hardware installation precautions.

NOTE

Some older SFP modules (mini-GBICs for Gigabit Ethernet ports) have latching mechanisms which are larger than the newer parts. These latches could interfere with one another when inserted side-by-side into a module. Avoid using these mini-GBICs side-by-side in the same module. These modules are identified by the numbers PL-XPL-00-S13-22 or PL-XPL-00-L13-23 above the serial number. Newer mini-GBICs do not have this limitation.

Before installing a fiber optic module, have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the chassis.

DANGER

For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

To install a fiber optic module into a Gigabit Ethernet or 10-Gigabit Ethernet port, complete the following tasks.

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the lower right corner of the chassis front.
2. Remove the module from the protective packaging.
3. If necessary, remove the metal cover from the port on the interface module control panel.
4. Insert the fiber-optic module into the port until the module clicks into place. Fiber-optic modules are keyed to prevent incorrect insertion.

Cabling a fiber optic module

To cable a fiber-optic module, complete the following tasks.

1. Remove the protective covering from the fiber optic module and store it for future use.
2. Before cabling a fiber optic module, it is strongly recommended that you clean the cable connectors and the port connectors. Refer to "Cleaning fiber optic modules".

3. Insert the cable connector (a tab on each connector should face up) into the port connector or until the tab locks into place.

Cleaning fiber optic modules

To avoid problems with connections between fiber optic modules (SFP (mini-GBIC), SFP+, or XFP) and the fiber cable connectors, it is strongly recommended that you clean both connectors each time you disconnect and reconnect them. Refer to "Cleaning the fiber optic connectors" on page 105.

Automatic MDI or MDIX detection

All 10/100 and Gigabit Ethernet copper ports on FastIron devices support automatic Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDIX) detection. This feature is enabled on all 10/100 and Gigabit copper ports by default. For each port, you can disable auto MDI or MDIX, or designate the port as an MDI port, or an MDIX port.

For more information about this feature refer to the *FastIron Configuration Guide*.

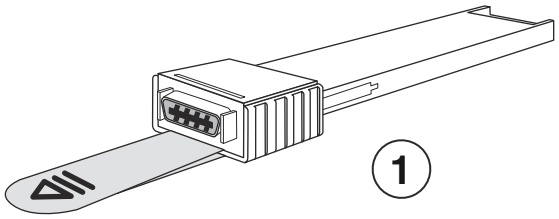
Using a CX4 transceiver

A twin-axial 10G copper CX4 XFP transceiver can be installed in any 10G port. For a link to operate properly, both sides must use identical CX4 transceivers. Refer to Figure 43.

The CX4 transceiver requires a 15 meter CX4-grade cable with 24 or 26 American Wire Gauge (AWG). This cable can be purchased from Brocade. Refer to part number CAB-CX4-0050 when ordering. Refer to Figure 44.

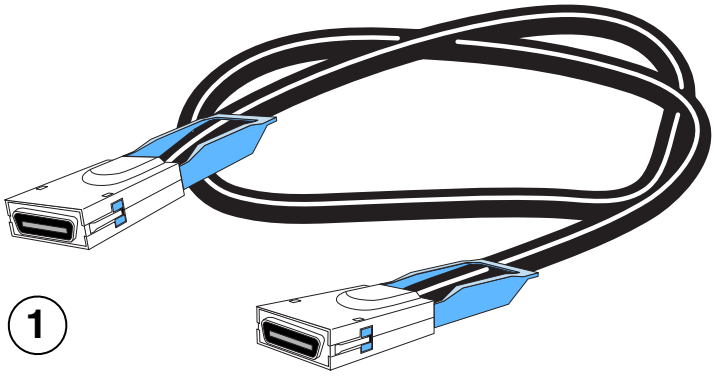
NOTE
The CX4 transceiver is not hot-swappable.

FIGURE 43 CX4 transceiver



1 CX4 transceiver

FIGURE 44 CX4 transceiver cable



1 CX4 transceiver cable

Testing network connectivity

After you install the network cables, you can test network connectivity to other devices by pinging those devices. You also can observe the LEDs related to network connection and perform trace routes.

For more information about **ping** and **traceroute** commands, refer to the *FastIron Configuration Guide*

Observing LEDs

After you install the network cables, you can observe certain LEDs to determine if the network connections are functioning properly. Table 22 outlines the LEDs related to the network connections, the desired state of each LED, possible abnormal states of each LED, and what to do if an LED indicates an abnormal state.

NOTE
Some modules use combined link and activity LEDs.

TABLE 22 Network connection-related LED states

LED	Desired State	Meaning	Abnormal State	Meaning or Action
Link	On (Green)	A link is established with the remote port.	Off	No link exists with the remote port. You can do the following: • Verify that the connection to the other network device has been properly made. Also, make certain that the other network device is powered on and operating correctly. • Verify that the transmit port on the Brocade device is connected to the receive port on the other network device, and that the receive port on the Brocade device is connected to the transmit port on the other network device. If you are not certain, remove the two cable connectors from the port connector and reinsert them in the port connector, reversing their order. • Dust may have accumulated in the cable connector or port connector. For information about cleaning the connectors, refer to "Cleaning fiber optic modules" on page 73. • If the other actions do not resolve the problem, try using a different port or a different cable.
Active	On or blinking (Yellow)	The port is transmitting and receiving user packets.	Off for an extended period.	The port is not transmitting or receiving user packets. You can do the following: • Check the Link LED to make sure the link is still established with the remote port. If not, take the actions described in the Meaning or Action column for the Link LED. • Verify that the port has not been disabled through a configuration change. You can use the CLI. If you have configured an IP address on the device, you also can use the Web Management Interface or *Brocade Network Advisor*.

If a problem persists after taking these actions, contact Brocade technical support.

Troubleshooting network connections

To resolve problems that may arise with network connections:

- For the indicated port, verify that both ends of the cabling (at the Brocade device and the connected device) are snug.
- Verify that the Brocade device and the connected device are both powered on and operating correctly.

- Verify that the port has not been disabled by a configuration change. You can use the CLI. If you have configured an IP address on the device, you also can use the Web Management Interface or *Brocade Network Advisor*.
- Verify that you have used the correct cable type for the connection:
  - For twisted-pair connections to an end node, use straight-through cabling.
  - For fiber-optic connections, verify that the transmit port on the device is connected to the receive port on the connected device, and that the receive port on device is connected to the transmit port on the connected device.
- For copper ports, you can test the cable using Virtual Cable Testing. For more information, refer to the chapter *Monitoring Hardware Components* in the *FastIron Configuration Guide*.
- If the other procedures do not resolve the problem, try using a different port or a different cable.

Support for digital optical monitoring

You can configure your Brocade device to monitor optical transceivers in the system, either globally or by specified ports. When this feature is enabled, the system monitors the temperature and signal power levels for the optical transceivers in the specified ports. Console messages and syslog messages are sent when optical operating conditions fall below or rise above the XFP or SFP manufacturer's recommended thresholds. For details about this feature and how to configure it, refer to the *FastIron Configuration Guide*.

Chapter

4

Managing the Chassis and Modules

Overview

This chapter contains information about refining the configuration of, monitoring, and managing the hardware components.

Displaying chassis status and temperature readings

You can display the following information about your Brocade device:

- Status of the power supplies
- Status of the fans
- Temperature readings and thresholds of the management and interface modules
- Temperature readings and thresholds of the switch fabric modules (FSX 800 and FSX 1600 only)
- The MAC address of the chassis

The following shows an example of the **show chassis** command output on the FSX 800.

```
Brocade# show chassis
Chassis Type: FastIron SX 800
Power supply 1 not present
Power supply 2 not present
Power supply 3 (H1250C - AC - Regular) present, status ok
Power supply 4 not present
Fan 1 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 2 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 3 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 4 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 5 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 6 ok, speed (auto): 1<->[[2]]<->3<->4
Fan controlled temperature:
    Rule 1/3 (MGMT CARDS THERMAL PLANE): 41.5 deg-C
    Rule 2/3 (LINE CARDS THERMAL PLANE): 44.0 deg-C
    Rule 3/3 (SWITCH FABRIC CARDS THERMAL PLANE): 49.5 deg-C
Fan speed switching temperature thresholds:
    Rule 1/3 (MGMT CARDS THERMAL PLANE):
        Speed 1: NM<----->57                          deg-C
        Speed 2:       48<----->58                    deg-C
        Speed 3:             49<----->59              deg-C
        Speed 4:                   50<----->80        deg-C (shutdown)
    Rule 2/3 (LINE CARDS THERMAL PLANE):
        Speed 1: NM<----->57                          deg-C
        Speed 2:       48<----->58                    deg-C
        Speed 3:             49<----->59              deg-C
        Speed 4:                   50<----->80        deg-C (shutdown)
    Rule 3/3 (SWITCH FABRIC CARDS THERMAL PLANE)***active***:
        Speed 1: NM<----->57                          deg-C
        Speed 2:       48<----->58                    deg-C
        Speed 3:             49<----->59              deg-C
        Speed 4:                     50<----->80          deg-C (shutdown)
Slot  1 Temperature: 44.0 deg-C
Slot  2 Temperature: 34.5 deg-C
Slot  3 Temperature: empty
Slot  4 Temperature: 39.5 deg-C
Slot  5 Temperature: empty
Slot  6 Temperature: empty
Slot  7 Temperature: empty
Slot  8 Temperature: empty
Slot  9 Temperature: 39.0 deg-C
Slot 10 Temperature: 41.5 deg-C
  SF  1 Temperature: 49.5 deg-C
  SF  2 Temperature: empty
Boot Prom MAC: 00e0.beef.0000
```

The following shows example output of the **show chassis** command on the FSX 1600.

```
Brocade# show chassis
Chassis Type: FastIron SX 1600-PREM
Power supply 1 not present
Power supply 2 not present
Power supply 3 not present
Power supply 4 (32005100 - AC - Regular) present, status ok
Power supply 5 not present
Power supply 6 not present Power supply 7 not present
Power supply 8 present, status failed, reason NO AC INPUT

Fan 1 ok, speed (auto): 1<->2<->[[3]]<->4<->5
Fan 2 ok, speed (auto): 1<->2<->[[3]]<->4<->5

Fan controlled temperature:
        Rule 1/3 (MGMT CARDS THERMAL PLANE): 41.0 deg-C
        Rule 2/3 (LINE CARDS THERMAL PLANE): 46.5 deg-C
        Rule 3/3 (SWITCH FABRIC CARDS THERMAL PLANE): 40.5 deg-C

Fan speed switching temperature thresholds:
        Rule 1/3 (MGMT CARDS THERMAL PLANE):
                Speed 1: NM<----->40                          deg-C
                Speed 2:       35<----->48                    deg-C
                Speed 3:             44<----->52              deg-C
                Speed 4:                   48<----->55        deg-C
                Speed 5:                         52<----->80  deg-C  (shutdown)
        Rule 2/3 (LINE CARDS THERMAL PLANE)***active***:
                Speed 1: NM<----->40                          deg-C
                Speed 2:       35<----->48                    deg-C
                Speed 3:             44<----->52              deg-C
                Speed 4:                   48<----->55        deg-C
                Speed 5:                         52<----->80  deg-C  (shutdown)
        Rule 3/3 (SWITCH FABRIC CARDS THERMAL PLANE):
                Speed 1: NM<----->30                          deg-C
                Speed 2:       25<----->40                    deg-C
                Speed 3:             35<----->55              deg-C
                Speed 4:                   50<----->65        deg-C
                Speed 5:                         60<----->90  deg-C  (shutdown)
Slot  1 Temperature: empty
Slot  2 Temperature: empty
Slot  3 Temperature: empty
Slot  4 Temperature: empty
Slot  5 Temperature: empty
Slot  6 Temperature: empty
Slot  7 Temperature: empty
Slot  8 Temperature: empty
Slot  9 Temperature: 34.5 deg-C
Slot 10 Temperature: 41.0 deg-C
```

cont'd on next page...

```
cont'd from previous page...
Slot 11 Temperature: 40.0 deg-C
Slot 12 Temperature: 46.0 deg-C
Slot 13 Temperature: 42.0 deg-C
Slot 14 Temperature: 44.5 deg-C
Slot 15 Temperature: 43.5 deg-C
Slot 16 Temperature: 40.0 deg-C
Slot 17 Temperature: 45.0 deg-C
Slot 18 Temperature: 41.5 deg-C
  SF  1 Temperature: 40.5 deg-C
  SF  2 Temperature: empty
Boot Prom MAC: 0012.f287.c900
```

The **show chassis** display shows the following information.

TABLE 23 Chassis status and temperature information

Field	Definition
Chassis Type	This field displays the chassis type. For example: • FSX 800 • FSX 1600 • FSX 1600-PREM -PREM indicates that the device is a premium device (supports full Layer 2 switching and full Layer 3 multiprotocol routing).
Power	
Power Supply	Indicates whether a power supply is installed in the specified power supply slot and the status of the power supply, which can be one of the following: • OK – The power supply is functioning properly and supplying power to the chassis and installed modules. • Failed – The power supply is not functioning and is not supplying power to the chassis and installed modules. This field also indicates: • the manufacturing part number • whether the supply is AC or DC • whether the supply is regular or POE. On the FSX 800, Power Supply 1 is the left-most slot, and Power Supply 4 is the right-most slot. These numbers assume you are facing the front of the chassis, not the rear. On the FSX 1600, Power Supply 1 is the top left-most slot, Power Supply 4 is the top right-most slot, Power Supply 5 is the bottom left-most slot, and Power Supply 8 is the right-most slot. These numbers assume you are facing the front of the chassis, not the rear.

TABLE 23 Chassis status and temperature information (Continued)

Field	Definition
Fans	
Fan <number>	For FSX 800, this field displays information about fans 1 through 6. Fan locations are: • Fan 1 – Left-most fan in bottom row • Fan 2 – Middle fan in bottom row • Fan 3 – Right-most fan in bottom row • Fan 4 – Left-most fan in top row • Fan 5 – Middle fan in top row • Fan 6 – Right-most fan in top row For the FSX 1600, this field displays information about fans 1 and 2. Fan locations are: • Fan 1 – This is Fan A and is the right-most fan in the rear of the chassis. • Fan 2 – This is Fan B and is the right-most fan in the rear of the chassis.
<Fan status>	The status of a fan can be one of the following: • OK – The fan is functioning properly and is keeping the temperature of each module within an acceptable temperature range. • Failed – The fan is not functioning properly or the fan control module cannot control the fan.
Speed <Operating mode>	The operating mode of a fan can be one of the following: • Auto (automatic) – This is the default • Manual
<Current fan speed>	The fan speed for the FSX 800 can be one of the following: • 1 (low) – The fan is functioning at 25 percent of capacity. • 2 (medium-low) – The fan is functioning at 37 percent of capacity. • 3 (medium) – The fan is functioning at 50 percent of capacity. • 4 (high) – The fan is functioning at 100 percent of capacity. The current fan speed is shown in double brackets.
Temperature	
Fan controlled temperature	The FSX 800 and FSX 1600 display the temperature reading of the management, interface, and switch fabric modules: • Rule 1/3 – The highest temperature reading of the management module or modules. • Rule 2/3 – The highest temperature reading of all the interface modules. • Rule 3/3 – The highest temperature reading of the switch fabric modules.
Fan speed switching temperature thresholds	• The FSX 800 and FSX 1600 display the configured temperature thresholds for the management, interface, and switch fabric modules. • Rule 1/3 (MGMT CARDS THERMAL PLANE) – The configured temperature thresholds for the management module or modules. • Rule 2/3 – (LINE CARDS THERMAL PLANE) – The configured temperature thresholds for all the interface modules. • Rule 3/3 – (SWITCH FABRIC CARDS THERMAL PLANE) – The configured temperature thresholds for the switch fabric modules. The output displays fan speed information for each of the above thermal planes. The FSX 800 chassis devices has four fan speeds as illustrated in Figure 45 on page 84.
Slot <number> Temperature	The temperature of each module. • On the FSX 800 and FSX 1600, the management modules are in slots 9 and 10 and the switch fabric modules are **SF 1** and **SF 2**.

TABLE 23 Chassis status and temperature information (Continued)

Field	Definition
Other information	
Boot PROM MAC	The MAC address of the chassis.

Managing the cooling system

This section provides configuration, management, and monitoring information for the cooling system in *FastIron X Series* chassis devices.

Configuring the cooling system

Since *FastIron X Series* chassis devices provide default settings for all cooling system parameters, no initial configuration of the cooling system is necessary. You can change the settings of the following cooling system parameters:

- Low and high temperature thresholds for modules and fan speeds
- Interval at which the system polls the temperature sensors on the module for a reading
- Temperature at which the device will shut down
- Fan speed

Thermal planes

The FSX 800 and FSX 1600 have three thermal planes:

- Thermal Plane 1 (also called Rule 1/3) – This thermal plane includes the temperature sensors on the management module or modules only. Each management module has two temperature sensors.
- Thermal Plane 2 (also called Rule 2/3) – This thermal plane includes all of the temperature sensors on all of the interface modules. Each interface module has one temperature sensor.
- Thermal Plane 3 (also called Rule 3/3) – This thermal plane includes all of the temperature sensors on the switch fabric modules. Each switch fabric module has one temperature sensor.

All thermal planes, along with temperature thresholds, help determine at which speed the fans should operate. For each thermal plane, you can define separate temperature thresholds for fan speeds. Each thermal plane can have different temperature thresholds.

For each thermal plane, the Brocade device records the highest temperature based on the temperature reading of all of the modules in the thermal plane. The system uses this information and the current configured temperature thresholds to adjust the fan speed. You can view the temperature of each thermal plane using the **show chassis** command.

Fan speed modes

The fans can operate in automatic or manual mode. The default is automatic mode. This section describes both methods.

Automatic mode

By default, the fans operate in automatic mode, self-adjusting their speed based on both of the following factors:

- The current temperature of each thermal plane
- The current configured temperature threshold ranges for all fan speeds

The Brocade device has default temperature threshold ranges for fan speeds (Table 24). If desired, you can change these settings.

The software regularly polls the chassis to obtain the temperature of each thermal plane, then uses this information to decide whether or not to switch the fan speed. By default, the Brocade device polls the chassis every 60 seconds for temperature data. You can change this interval using the CLI command **chassis poll-time**.

If the temperature of a thermal plane exceeds the high temperature level of the temperature range associated with the current fan speed in the associated plane, the system will switch the fan speed to the next higher level. For example, the current fan speed is 3 (medium), and the configured operating temperature range for fan speed 3 is 40 to 50 degrees Centigrade for Thermal Plane 2. Based on this configuration, if the temperature of Thermal Plane 2 rises to 51 degrees Centigrade, the system will automatically increase the fan speed to fan speed 4.

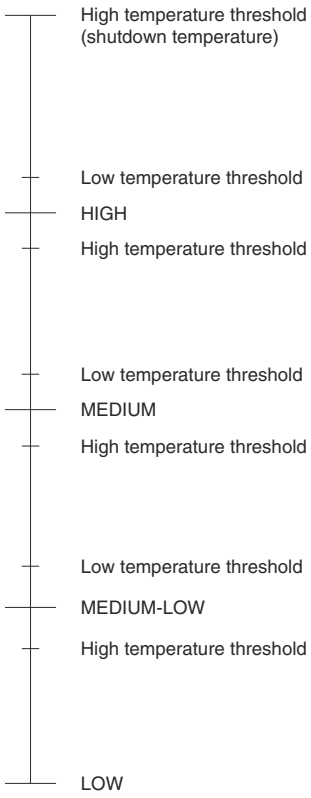
Manual mode

Typically, the fans operate in automatic mode, as described above. If desired, you can manually set the speed at which the fans will operate. For more information, refer to "Manually setting the fan speed" on page 87.

Changing temperature thresholds for thermal planes and fan speeds

The cooling system in the FSX 800 includes six four-speed fans. The fans operate at speeds of low, medium-low, medium, and high. In general, each fan speed, except for low, has a low and high temperature threshold associated with it as shown in Figure 45. The low fan speed has a high temperature threshold only.

FIGURE 45 Fan speeds and temperature thresholds



The low and high temperature thresholds enable the Brocade device to determine at which speed the fans should operate. In general, the fans operate as follows:

- If the temperature of all thermal planes is between the low and high thresholds for a fan speed, the fan continues to operate at that fan speed.
- If the temperature of any thermal plane exceeds the high threshold specified for a fan speed, the fan speed increases to the next higher speed. If the temperature of any thermal plane exceeds the high threshold for the high speed and remains above the threshold for five minutes, the system automatically shuts down to prevent damage.
- If the temperature of any thermal plane falls below the low threshold for a fan speed, the fan decreases its speed to the next lower speed. If the temperature of any thermal plane falls below the high threshold for the low speed, the fan operates at the low speed.

If the temperature of any thermal plane exceeds the high temperature threshold for any of the fan speeds, the software sends a message to the system log.

Table 24 outlines the default low and high temperature thresholds for each fan speed, as well as the operating level and noise level of the fans at each fan speed.

TABLE 24 Default low and high temperature thresholds for thermal planes and fan speeds

Fan Speed	Description	Low Temperature Threshold	High Temperature Threshold	Fan Operating Level (% of Capacity)	Fan Noise Level
4	High	50° C	80° C	100	78 dB
3	Medium	49° C	59° C	50	66 dB
2	Medium-low	48° C	58° C	37	63 dB
1	Low	N/A	57° C	25	56 dB

For information about checking the current settings of the low and high temperature thresholds for modules and fan speeds, refer to "Displaying temperature thresholds for thermal planes and fan speeds" on page 86.

Command syntax

If desired, you can change the default low and high temperature thresholds for a particular thermal plane and fan speed. For example, to change the low and high thresholds of the medium fan speed for the management module or modules to 56° C and 72° C, respectively, enter the following command at the global CONFIG level of the CLI.

```
Brocade(config)# fan-threshold mp speed-3 56 72
```

Syntax: **fan-threshold** <*module*> [**speed-1** <*high-threshold*>] [**speed-2** <*low-threshold*> <*high-threshold*>] [**speed-3** <*low-threshold*> <*high-threshold*>] [**speed-4** <*low-threshold*> <*high-threshold*>]

For the <module> parameter, specify one of the following:

- **lp** – Changes low and high temperature thresholds for the Interface modules.
- **mp** – Changes low and high temperature thresholds for the management module.
- **sfp** – (FSX 800 and FSX 1600 only) Changes low and high temperature thresholds for the switch fabric modules.

The fan speeds are as follows:

- speed-1 – low
- speed-2 – medium-low
- speed-3 – medium
- speed-4 – high (shutdown temperature)

For the <*low-threshold*> and <*high-threshold*> variables, you can specify any temperature in Centigrade. However, when changing low and high temperature thresholds for a module's fan speeds, remember that the low temperature threshold of a higher fan speed must be lower than the high temperature threshold of the lower fan speed. Brocade establishes this guideline to ensure the fan speed stability.

For example, if you are changing the temperature thresholds for the management module's high and medium-high fans speeds, the Brocade device will accept the following values because the low temperature threshold for the high speed (67° C) is lower than the high temperature threshold (72° C) for the medium-high speed.

Fan Speed	Low Temperature Threshold	High Temperature Threshold
High	67° C	82° C
Medium-high	57° C	72° C

However, the Brocade device will not accept the following values because the low temperature threshold for the high speed (73° C) is higher than the high temperature threshold (72° C) for the medium-high speed.

Fan Speed	Low Temperature Threshold	High Temperature Threshold
High	73° C	82° C
Medium-high	57° C	72° C

The <high-threshold> temperature for the high fan speed (speed-4) is the shutdown temperature. If a thermal plane's fan-controlled temperature reaches and stays at the shutdown temperature for five minutes, the Brocade device will automatically shut down to prevent damage.

Displaying temperature thresholds for thermal planes and fan speeds

To check the current settings of the low and high temperature thresholds for thermal planes and fan speeds, enter the **show chassis** command at any level of the CLI.

The following shows an example of the **show chassis** command output on the FSX 800. The display is similar on the FSX 1600. This display shows the currently configured temperature thresholds for the management module or modules (Rule 1/3), all of the interface modules (Rule 2/3), and the switch fabric modules (Rule 3/3).

```
Brocade# show chassis
...
Fan speed switching temperature thresholds:
    Rule 1/3 (MGMT CARDS THERMAL PLANE):
        Speed 1: NM<----->57                            deg-C
        Speed 2:       48<----->58                      deg-C
        Speed 3:             49<----->59                deg-C
        Speed 4:                   50<----->80          deg-C (shutdown)
    Rule 2/3 (LINE CARDS THERMAL PLANE):
        Speed 1: NM<----->57                            deg-C
        Speed 2:       48<----->58                      deg-C
        Speed 3:             49<----->59                deg-C
        Speed 4:                   50<----->80          deg-C (shutdown)
    Rule 3/3 (SWITCH FABRIC CARDS THERMAL PLANE)***active***:
        Speed 1: NM<----->57                            deg-C
        Speed 2:       48<----->58                      deg-C
        Speed 3:             49<----->59                deg-C
        Speed 4:                   50<----->80          deg-C (shutdown)
...
```

Syntax: show chassis

Shutdown warning messages

If any thermal plane exceeds the shutdown temperature level, the Brocade device will display a shutdown warning message on the console every five seconds until either the temperature level goes back down below the shutdown temperature level, or the system shuts down the chassis to prevent further damage (shutdown occurs after five minutes of exceeding the shutdown temperature level).

The shutdown warning messages indicate the thermal plane that triggered the warning and the number of seconds before the device will shut down. The following shows an example warning message.

```
!!! Temperature of SWITCH FABRIC CARDS THERMAL PLANE is over shutdown level,
system is going to be shutdown in 300 seconds !!!
```

Changing the temperature polling interval

By default, the Brocade device reads the temperature sensor on each module every 60 seconds. To change the interval at which the system reads the temperature sensors, enter a command such as the following at the global CONFIG level of the CLI.

```
Brocade(config)# chassis poll-time 120
```

Syntax: chassis poll-time <*seconds*>

For the <*seconds*> variable, you can specify any number of seconds. If you specify 0, the system reverts to 60 seconds, the default value.

Manually setting the fan speed

NOTE
Use caution when manually setting the fan speed, since this could adversely affect the device's performance.

Typically, the temperature of the thermal planes, in conjunction with the settings of low and high temperature thresholds, determine the speed of the fans. If desired, you can use the **fan-speed** command to manually set the speed of the fans.

For example, to set the speed of all fans to low, enter the following command.

```
Brocade# fan-speed 1
```

Syntax: fan-speed <*fan-speed*>

<*fan-speed*> can be one of the following.

1 – low

2 – medium-low

3 – medium

4 – high

Monitoring the cooling system

You can monitor the following aspects of the cooling system:

- The temperature of the fan control modules
- The status and speed of the fans
- The temperature warnings sent to the system log

Displaying the temperature

By default, the Brocade device polls the temperature sensor on each module every 60 seconds to get the temperature of each module. The Brocade device records the *highest* temperature reading of the modules in each thermal plane.

The **show chassis** command displays the temperature reading of each thermal plane, as shown in the following examples.

This following shows an example output.

```
Brocade# show chassis
...
Fan controlled temperature:
        Rule 1/2 (MGMT CARDS THERMAL PLANE): 53.0 deg-C...
        Rule 2/2 (LINE CARDS THERMAL PLANE): 59.0 deg-C...
...
```

The following shows an example output on the FSX 800. The output is similar on the FSX 1600.

```
Brocade# show chassis
...
Fan controlled temperature:
        Rule 1/3 (MGMT CARDS THERMAL PLANE): 55.5 deg-C...
        Rule 2/3 (LINE CARDS THERMAL PLANE): 59.6 deg-C...
        Rule 3/3 (SWITCH FABRIC CARDS THERMAL PLANE): 78.7 deg-C...
...
```

Syntax: show chassis

Displaying fan status and speed

The **show chassis** command displays the status and speed of the fans in the Brocade chassis. The following shows an example output.

```
Brocade# show chassis
...
Fan 1 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 2 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 3 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 4 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 5 ok, speed (auto): 1<->[[2]]<->3<->4
Fan 6 ok, speed (auto): 1<->[[2]]<->3<->4
...
```

Syntax: show chassis

For each fan, the display shows the following information.

TABLE 25 Fan status and speed fields

This Field...	Displays...
Status	The status of the fan. This field can be one of the following: • OK – The fan is functioning properly and is keeping the temperature of each module within an acceptable temperature range. • Failed – The fan is not functioning properly or the fan control module cannot control the fan.
Speed	The speed at which the fan is currently operating (denoted by double brackets). This field shows one of the following: • 1 (low) – The fan is functioning at 25 percent of capacity. • 2 (medium-low) – The fan is functioning at 37 percent of capacity. • 3 (medium) – The fan is functioning at 50 percent of capacity. • 4 (high) – The fan is functioning at 100 percent of capacity. **NOTE:** If the report shows that a fan has "failed", the report does not show the fan's speed.

Displaying temperature warnings

If the temperature of a module exceeds the high temperature threshold for any of the fan speeds, the system sends a message to the system log. This section describes how to view the system log. If you have configured the system to use a Syslog server, refer to the documentation for the server or receiver.

To display the system log, enter the following command at any CLI level.

```
Brocade# show log
...
Dynamic Log Buffer (50 lines):
0d00h06m25s:N:System: Fan speed changed automatically to 2
0d00h05m14s:N:System: Fan speed changed automatically to 1
0d00h00m15s:I:System: Interface ethernet 8/1, state up
0d00h00m14s:I:System: Cold start
...
```

Syntax: show log

Displaying the Syslog configuration and static and dynamic buffers

For information about configuring Syslog, refer to the *FastIron Configuration Guide*.

To display the Syslog parameters currently in effect on a system, enter the following command from any level of the CLI.

```
Brocade> show logging
Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
    Buffer logging: level ACDMEINW, 7 messages logged
    level code: A=alert C=critical D=debugging M=emergency E=error
                I=informational N=notification W=warning
...
```

Syntax: show logging

The Syslog display shows the following configuration information, in the rows above the log entries themselves.

TABLE 26 Syslog buffer configuration

This Field...	Displays...
Syslog logging	The state (enabled or disabled) of the Syslog buffer.
messages dropped	The number of Syslog messages dropped due to user-configured filters. By default, the software logs messages for all Syslog levels. You can disable individual Syslog levels, in which case the software filters out messages at those levels. Each time the software filters out a Syslog message, this counter is incremented.
flushes	The number of times the Syslog buffer has been cleared by the **clear logging** command. For information about clearing the Syslog buffer, refer to "Static and dynamic buffers" on page 90.
overruns	The number of times the dynamic log buffer has filled up and been cleared to hold new entries. For example, if the buffer is set for 100 entries, the 101st entry causes an overrun. After that, the 201st entry causes a second overrun.
level	The message levels that are enabled. Each letter represents a message type and is identified by the key (level code) below the value. If you disable logging of a message level, the code for that level is not listed.
messages logged	The total number of messages that have been logged since the software was loaded.
level code	The message levels represented by the one-letter codes.

Static and dynamic buffers

The software provides two separate buffers:

- Static – logs power supply failures, fan failures, and temperature warning or shutdown messages
- Dynamic – logs all other message types

In the static log, new messages replace older ones, so only the most recent message is displayed. For example, only the most recent temperature warning message will be present in the log. If multiple temperature warning messages were sent to the log, the latest one will replace the previous one. The static buffer is not configurable.

The message types that appear in the static buffer do not appear in the dynamic buffer. The dynamic buffer contains up to the maximum number of messages configured for the buffer (50 by default), then begins removing the oldest messages (at the bottom of the log) to make room for new ones.

The static and dynamic buffers are both displayed when you display the log.

```
Brocade(config)# show logging
...
Static Log Buffer:
Aug 27 12:42:42:A:Power Supply 6, 1st right, failed

Dynamic Log Buffer (50 lines):
Aug 27 12:19:04:I:Interface ethernet3/4, state up
Aug 27 12:19:04:I:Interface ethernet6/3, state up
Aug 27 12:19:04:I:Interface ethernet3/2, state up
Aug 27 12:19:04:I:Interface ethernet6/1, state up
Aug 27 12:19:00:N:Module up in slot 6
Aug 27 12:19:00:N:Module up in slot 3
Aug 27 12:18:43:I:Warm start
```

When you clear log entries, you can selectively clear the static or dynamic buffer, or you can clear both. For example, to clear only the dynamic buffer, enter the following command at the Privileged EXEC level.

```
Brocade# clear logging dynamic-buffer
```

Syntax: clear logging [**dynamic-buffer** | **static-buffer**]

You can specify the **dynamic-buffer** keyword to clear the dynamic buffer or the **static-buffer** keyword to clear the static buffer. If you do not specify a buffer, both buffers are cleared.

Syntax: show log

Syslog messages for PCI (hardware) errors

FastIron Chassis devices support the display of PCI (hardware) read and write errors encountered on a slot or module during bootup and during normal system operations. There are four types of PCI errors, which may cause the system to disable or power down the module or modules on which they occur:

- Configuration read error
- Configuration write error
- Memory read error
- Memory write error

For more information, refer to the "*Using Syslog*" chapter in the *FastIron Configuration Guide*.

Managing the switch fabric modules (FSX 800 and FSX 1600 only)

If desired, you can disable power to a switch fabric module and then re-enable it. To disable the power, enter the following command at the Privileged EXEC level of the CLI.

```
Brocade# disable switch-fabric 1
```

Syntax: disable switch-fabric 1 | **2**

where **switch-fabric 1** is the left-most module in the FSX 800 chassis and the top-most module in the FSX 1600 chassis, and **switch-fabric 2** is the right-most module in the FSX 800 chassis and the bottom-most module in the FSX 1600 chassis.

To re-enable power to the switch fabric module, enter the following command at the Privileged EXEC level of the CLI.

```
Brocade# enable switch-fabric 1
```

Syntax: enable switch-fabric 1 | 2

where **switch-fabric 1** is the left-most module in the FSX 800 chassis and the top-most module in the FSX 1600 chassis, and **switch-fabric 2** is the right-most module in the FSX 800 chassis and the bottom-most module in the FSX 1600 chassis.

Displaying management module CPU usage

You can display the amount of the management module's CPU in use. To do so, enter the following command at any level of the CLI.

```
Brocade# show cpu
31 percent busy, from 3248 sec ago
1   sec avg:  31 percent busy
5   sec avg:  31 percent busy
60  sec avg:  31 percent busy
300 sec avg:  31 percent busy
```

Syntax: show cpu

Removing MAC address entries

You can remove learned MAC address entries from the Brocade system's MAC address table. You can remove the following:

- All MAC address entries.
- All MAC address entries for a specified Ethernet port.
- All MAC address entries for a specified VLAN.
- A specified MAC address entry in all VLANs.

For example, to remove entries for the MAC address 000d.cb80.00d in all VLANs, enter the following command at the Privileged EXEC level of the CLI.

```
Brocade# clear mac-address 000d.cb80.00d0
```

Syntax: clear mac-address <*mac-address*> | **ethernet** <*slot*>/<*port*> | **vlan** <*number*>

If you enter the **clear mac-address** command without any parameters, the software removes all MAC entries.

Use the <*mac-address*> variable to remove a specified MAC address from all VLANs. Specify the MAC address in the following format: HHHH.HHHH.HHHH.

Use the **ethernet** <*slot*>/<*port*> variable to remove all MAC addresses for a specified Ethernet port. For the <slot> parameter, enter the number of the chassis slot in which the Ethernet interface module is installed. For the <port> parameter, enter the Ethernet port whose MAC address you want to remove.

Use the **vlan** <number> parameter to remove all MAC addresses for a specified VLAN.

Chapter

Using a Redundant Management Module 5

Overview

NOTE
This chapter applies to the FSX 800 and FSX 1600 chassis devices only.

You can install a redundant management module in the FSX 800 and FSX 1600 chassis. By default, the system considers the module installed in the lower-numbered slot to be the active management module, and the module installed in the higher-numbered slot to be the redundant or standby module. If the active module becomes unavailable, the standby module automatically takes over management of the system.

This chapter describes the redundant management module, how it works with the active module, and how to configure and manage it.

This chapter provides the following information:

- How management module redundancy works
- Optional management module redundancy configurations that you can perform
- How to manage and monitor the redundancy feature

NOTE
Hitless management features (hitless Layer 2 switchover and hitless Layer 2 OS upgrade) are discussed in the *FastIron Configuration Guide*.

How Management module redundancy works

This section explains the following:

- How management module redundancy works under normal operating conditions.
- Events that cause a standby management module to assume the role of the active module and how the switchover occurs as a result of each event.
- Implications that you should be aware of if a switchover occurs.

Management module redundancy overview

When you power on or reload a FSX 800 or FSX 1600 chassis with two management modules installed, by default, the management module installed in the lower-numbered slot becomes the active module and the management module in the higher-numbered slot becomes the standby module. (You can change the default active slot using the **set-active-mgmt** command. For information about performing this task, refer to "Changing the default active chassis slot" on page 98.)

After the active and standby modules are determined, both modules boot from the source specified for the active module. The active management module boots from the active management module's flash memory.

After the modules boot, the active module synchronizes the standby module's flash code and system-config file with its own.

During normal operation, the active module handles tasks such as obtaining network topology and reachability information and determining the best paths to known destinations. The active module also monitors the standby module.

The standby module functions in an active standby mode. Keeping the system-config and running-config files on both modules synchronized allows the standby module to assume the role of active module seamlessly if necessary.

During a switchover, the standby management module takes over the active role and re-initializes all the interface modules in the system that are not CLI-disabled by the administrator. This may cause a brief interruption of the traffic forwarding.

Management module switchover

The following events cause the standby management module to become the active module, which is called a ***switchover***:

- The active module becomes unavailable
- You perform a manual switchover
- You remove and replace the active management module

The following sections explain how the switchover occurs for each event

Unavailable active module

The following events cause an active module to become unavailable and a switchover to occur:

- An active module experiences a problem significant enough to cause a reset of the module.
- The active module loses power.

When a switchover occurs, the active module resets itself and sends an interrupt signal to the standby module. The standby module then becomes the active module and the interface modules continue to forward traffic.

The new active module begins to manage the system. When the original active module becomes available again or is replaced, it assumes the role of standby module.

Manual switchover

In some situations, you may want to manually switch the role of active management module from the currently active module to the standby module. For instance, when you want to remove the current active management module for maintenance. For example, if the module in slot 10 is the active module and the module in slot 9 is the standby module and you want the module in 9 to be the active module and the module in 10 to be the standby module, you can perform a manual switchover using the **switch-over-active-role** command.

For information about performing this task, refer to "Manually switching over to the standby management module" on page 100.

When the switchover occurs, the standby module becomes the active module.

Hitless switchover is also supported. For more information, refer to the *FastIron Configuration Guide*.

Removal and replacement of a management module

For information about how to remove and replace a management module, refer to "Replacing a management module" on page 106.

This section explains how management module redundancy is affected when you remove and replace an active or standby management module.

Removal and replacement of an active management module

If you remove the active management module, the standby module automatically assumes the role of the active module. After you insert a replacement module in the slot from which the original active module was removed, the replacement module becomes the standby module. The module boots from the source specified for the active module. The active management module boots from the active management module's flash memory.

NOTE
Before removing the active management module, Brocade recommends that you first issue the command **switch-over-active-role**. For details, refer to "Manually switching over to the standby management module" on page 100.

After the replacement module boots, the active module compares the standby module's flash code and system-config file to its own. If differences exist, the active module synchronizes the standby module's flash code and system-config file with its own.

Removal and replacement of a standby management module

You can remove a standby management module without causing a switchover to occur. The active module continues to function as is. Communication between the active module and the removed module stops until the new module is installed in the chassis. After the new module is installed, it assumes the role of standby module. The module boots from the source specified for the active module. The active management modules boot from the active management module's flash memory.

After the module boots, the active module compares the standby module's flash code and system-config file to its own. If differences exist, the active module synchronizes the standby module's flash code and system-config file with its own.

Switchover implications

After the role of the active management module switches from one module to another, you must be aware of implications that affect the following areas:

- Management sessions
- Syslog and SNMP traps
- MAC addresses

The following sections explain the implications for these areas.

Management sessions

You can establish management sessions with the active management module's management port. If a switchover occurs, the management port on the original active module shuts down and all open CLI, Web Management Interface, and Brocade Network Advisor sessions with that port close. You can open new sessions with the new active module, provided that the new active module has the same management port connections. (For example, if you were accessing the Web Management Interface through a PC connected to the original active module's management port, you can open a new session if a PC is connected to the new active module's management port.)

In the scenario described above, you can open a new session using the same IP address you were using before the switchover. (You configure an IP address for the active module only; if a switchover occurs, the IP address is used by the new active module.)

Syslog and SNMP traps

When a switchover occurs, the system sends a Syslog message to the local Syslog buffer and also to the Syslog server, if you have configured the system to use one. In addition, if you have configured an SNMP trap receiver, the system sends an SNMP trap to the receiver.

When the system is powered on or otherwise reset normally, the system sends a cold start message and trap. However, if the system is reset as the result of switchover to the standby management module, the system instead sends a warm start message and trap.

MAC address changes

The MAC addresses in the system are based on the MAC address of the chassis. During switchover, the system's MAC addresses do not change.

Management module redundancy configuration

Configuring management module redundancy consists of performing one optional task (changing the default active chassis slot). The following section explains how to perform this task.

Changing the default active chassis slot

By default, the system considers the module installed in the lower-numbered slot to be the active management module. If desired, you can change the default active chassis slot to the higher-numbered slot.

To change the default active chassis slot, enter commands such as the following.

```
Brocade# config t
Brocade(config)# set-active-mgmt mgmt1
```

Syntax: [no] **set-active-mgmt mgmt0** | **mgmt1**

mgmt0 is the lower-numbered slot and **mgmt1** is the higher-numbered slot.

To remove the configuration, use the **no** form of the command. You cannot use the **erase startup** command to remove the configuration.

To view the default active chassis slot currently configured on the device, use the **show run** command.

Managing management module redundancy

The FSX 800 and FSX 1600 support the following management tasks related to management module redundancy:

- Perform immediate synchronization of files
- Perform a manual switchover to the standby module
- Reboot the standby module

File synchronization between the active and standby management modules

Each active and standby management module contains the following files that can be synchronized between the two modules:

- Flash code – The flash code can include the following files:
  - Primary – Contains the management module's primary IronWare image.
  - Secondary – Contains the management module's secondary IronWare image.

  The primary and secondary files also include a monitor file, which contains the management module's Real Time Operating System (RTOS).

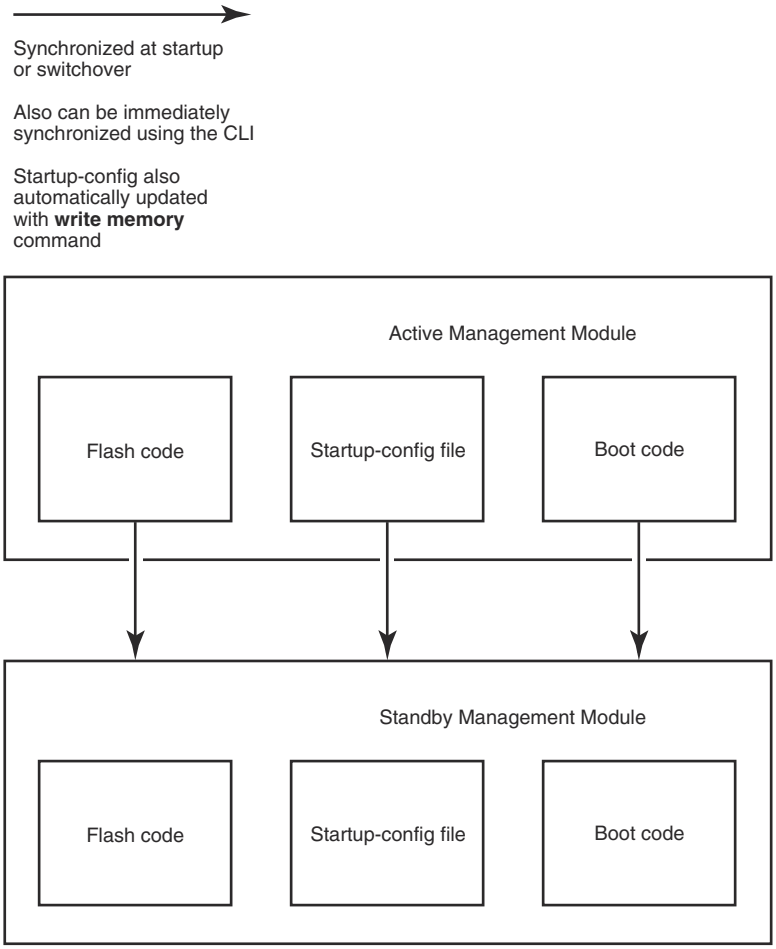
  The IronWare image contains the layer 1 – 3 software run by the management module.

  During startup or switchover, the active module automatically synchronizes the standby module's flash code with its own. Also, when you update the flash code on the active module, the active module automatically synchronizes the standby module's flash code with its own.
- System-config file – The flash code also includes the system-config file. During startup or switchover, the active module compares the standby module's system-config file to its own. If differences exist, the active module synchronizes the standby module's system-config file with its own. When you save changes to the system-config file on the active module, the active module automatically synchronizes (without comparison) the standby module's system-config file with its own.
- SSH and SSL keys
- Flash file for the DHCP snooping feature

Each active and standby management module also includes boot code, which is the code a module runs when it first starts up. The boot code resides in each module's boot flash. The boot code is synchronized between the two modules.

Figure 46 shows how the files are synchronized between the active module and the standby module.

FIGURE 46 Active and standby management module file synchronization



Manually switching over to the standby management module

This section describes how to manually switch the role of active management module from the currently active module to the standby module.

NOTE
Hitless switchover is also supported. An enhancement to the manual switchover feature, a hitless switchover enables a switchover of the active management module to standby module without interrupting switched traffic. For details, refer to the *FastIron Configuration Guide*.

You can cause the system to switch over to the standby module (and thus make it the active module). To do so, enter the following command.

```
Brocade# switch-over-active-role
```

Once you enter this command, the system will prompt you as follows.

```
Are you sure? (enter 'y' or 'n'): y
Running Config data has been changed. Do you want to continue
the switch-over without saving the running config? (enter 'y' or 'n'): n
Please save the running config and try switch-over again
```

Syntax: switch-over-active role

Rebooting the active and standby management modules

You can use the **boot system** or **reload** commands to reboot the management modules, maintaining the currently configured active management module (the management module to which the **set-active-mgmt** command applies).

For example, to reboot the active and standby management modules from the primary IronWare image in the management module's flash memory, enter the following command at the Privileged EXEC level.

```
Brocade# boot system flash primary
```

Syntax: boot system bootp | [**flash primary** | **flash secondary**] | **slot** | **tftp** <*ip-address*> <*filename*>

The **flash primary** keyword specifies the primary IronWare image in the management module's flash memory, while the **flash secondary** keyword specifies the secondary IronWare image in the flash memory.

The **tftp** keyword directs the switch to boot from an IronWare image on a TFTP server located at <ip-address> with the specified <filename>.

NOTE
To reboot the device from a TFTP server through a *fiber* connection, use the CLI command **boot system tftp <ip-address> <filename> fiber-port**.

For example, to reboot the active and standby management modules, enter the following command at the Privileged EXEC level.

```
Brocade# reload
```

Syntax: reload

Monitoring management module redundancy

You can monitor the following aspects of management module redundancy:

- The status of the management modules (if a module is the active or standby module)
- The switchover history for the management modules

The following sections explain how you can monitor the management modules

Determining management module status

You can determine the status of a management module in the following ways:

- LEDs – The LEDs on the management module indicate whether a module is the active module or the standby module, and if the module has power.
- Redundant management and module information in software – The module information displayed by the software indicates whether a module is the active module or the standby module.

Status LED

If you are located near the chassis, you can determine which management module is currently the active module and which is the standby module by observing the Active LED on each module. If this LED is on (green), the module is the active module. If this LED is off, the module is the standby module.

You can also observe the Pwr LED on each module. If this LED is on (green), the module is receiving power. If this LED is off, the module is not receiving power. (A module without power will not function as the active or standby module.)

Software

You can use the **show module** CLI command to display the status of the management modules.

The following shows an example output of the **show module** command.

```
Brocade# show module
    Module                                  Status    Ports
Starting MAC
 F1: SX-FISF Switch Fabric                   active
 F2: SX-FISF Switch Fabric                   active
 S1: SX-F424C 24-port Gig Copper             OK         24
00e0.5200.0100
 S2:
 S3:
 S4:
 S5: SX-F424C 24-port Gig Copper             OK         24
00e0.5200.0160
 S6:
 S7:
 S8:
 S9: SX-FI2XGMR4 2-port Management           Active      2
00e0.5200.0100
     { Status : OK }
S10: SX-FI2XGMR4 2-port Management           Standby     2
00e0.5200.0100
     { Status : OK }
```

Syntax: show module

The Status column indicates the module status. The management modules can have one of the following statuses:

- ACTIVE – The module is currently the active management module.
- STANDBY – The module is the standby management module. The status of the standby module can be one of the following:
  - Init – The module is currently initializing as the standby module.
  - OK – The module is ready to take over as the active module, if necessary.
  - Wait – The module is awaiting boot information from the active management module.
  - Sync – The active module is currently synchronizing files between itself and the standby module.

Displaying temperature information

Each management module contains two temperature sensors. By default, the system polls the temperature of each management module every 60 seconds. You can display the current temperature of the management modules (and all other modules) by entering the following command at any CLI level.

```
Brocade# show chassis
...
Slot  9 Temperature: 31.0 deg-C
Slot 10 Temperature: 34.0 deg-C
...
```

Syntax: show chassis

The output displays the temperature of the management modules. For information about all output generated by the **show chassis** command, refer to "Overview" on page 77.

Displaying switchover information

You can view the system log or the traps logged on an SNMP trap receiver, which includes Information about whether a switchover has occurred. For Syslog messages related to hitless OS upgrade and hitless switchover, refer to the *FastIron Configuration Guide*.

To view the system log or the traps logged on an SNMP trap receiver, enter the following command at any level of the CLI.

```
Brocade# show log
Syslog logging: enabled (0 messages dropped, 0 flushes, 0
overruns)
    Buffer logging: level ACDMEINW, 25 messages logged
    level code: A=alert C=critical D=debugging M=emergency E=error
                I=informational N=notification W=warning

Dynamic Log Buffer (50 lines):
0d14h43m52s:N:System: Module was inserted to slot 9
0d14h43m23s:N:System: Fan speed changed automatically to 3
0d14h43m23s:N:System: Fan speed changed automatically to 3
0d14h43m23s:N:System: Fan speed changed automatically to 3
0d14h43m23s:N:System: Fan speed changed automatically to 3
0d14h43m23s:N:System: Fan speed changed automatically to 3
0d14h43m23s:N:System: Fan speed changed automatically to 3
0d14h43m20s:I:System: Interface ethernet 5/2, state up
0d14h43m19s:I:System: Interface ethernet 3/2, state up
0d14h43m19s:I:System: Interface ethernet mgmt1, state up
0d14h43m19s:I:System: Interface ethernet 6/13, state up
0d14h43m18s:I:System: Interface ethernet 4/1, state up
0d14h43m18s:I:System: Interface ethernet 2/13, state up
0d14h43m18s:N:System: Fan speed changed automatically to 2
0d14h43m18s:N:System: Fan speed changed automatically to 2
0d14h43m18s:N:System: Fan speed changed automatically to 2
0d14h43m18s:N:System: Fan speed changed automatically to 2
0d14h43m18s:N:System: Fan speed changed automatically to 2
0d14h43m18s:N:System: Fan speed changed automatically to 2
0d14h43m18s:I:System: Interface ethernet 1/13, state up
0d14h43m16s:N:powered On switch Fabric
0d14h43m09s:N:powered On switch Fabric
0d14h43m01s:I:Mgmt CPU1 slot 9 failed
0d14h43m01s:I:System: Warm start
0d14h43m01s:I:SNMP: read-only community added by  from session FastIron SX 800
```

This output shows that one switchover occurred.

Chapter

6 Maintaining the Hardware

Overview

This chapter provides instructions for maintaining the *FastIron X Series* chassis hardware.

DANGER

The procedures in this manual are for qualified service personnel.

Hardware maintenance schedule

The *FastIron X Series* chassis requires minimal maintenance for its hardware components. Brocade recommends cleaning the fiber-optic connectors on a fiber-optic port and the connected fiber cable each time you disconnect the cable.

Otherwise, you can replace the following hardware components as needed:

- Management and interface modules
- Switch fabric modules (FSX 800 and FSX 1600 only)
- POE daughter card
- Copper and fiber optic modules (SFPs (mini-GBICs), SFP+, and XFP transceivers)
- Power supplies
- Fan tray
- Blowers (FSX 800 and FSX 1600 only)
- Air filters

Cleaning the fiber optic connectors

To avoid problems with the connection between the fiber optic module (SFP (mini-GBIC), SFP + or XFP) and the fiber cable connectors, Brocade strongly recommends cleaning both connectors each time you disconnect and reconnect them. In particular, dust can accumulate in the connectors and cause problems such as reducing the optic launch power.

To clean the fiber cable connectors, Brocade recommends using the fiber-optic reel-type cleaner that shipped with your chassis. You can also purchase this type of cleaner from the following Website.

http://www.fisfiber.com

When not using an SFP, SFP+ or XFP connector, make sure to keep the protective covering on.

Replacing a management module

This section provides information about the following tasks:

- Removing a management module
- Installing a new management module

This section provides instructions for removing and installing the management modules in the FSX 800 and FSX 1600 chassis. Although the modules are dedicated and differ in size, the procedure for installing them is the same. Therefore, this section provides one procedure that applies to all modules.

Installation precautions

Note the following when removing and installing a management module:

- The management modules are dedicated, which means that you must install them in the appropriate chassis. If you attempt to install the FSX management module in the FSX 800, FSX 1600, or other Brocade chassis, the chassis and module will not function properly. Likewise, if you attempt to install the FSX 800 or FSX 1600 management module in the FSX or other Brocade chassis, the chassis and module will not function properly.
- If your Brocade chassis has redundant management modules, you can remove one of the management modules from the chassis while the chassis is powered on and running. This does not apply to the FSX 800 and FSX 1600 with single management modules. These devices must be powered down before removing the management module.

CAUTION

If your device does not have dual management modules, do not remove the management module.

- If your device does not have dual management modules, do not remove the management module while the chassis is powered on and running. If you attempt to remove this module while the chassis is powered on and running, all traffic being handled by the system will stop.
- Before removing and replacing an active or standby management module, you need to understand how these actions affect management module redundancy. Refer to "Removal and replacement of a management module" on page 97.
- You cannot mix IPv4 and IPv6 modules together in the same device. Interface modules that universal support IPv4 and IPv6 may be used interchangeably with IPv4-only or IPv6-only modules.

Removing a management module

Before removing a management module, have the following tools on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the chassis.

DANGER

For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

- A #2 Phillips-head or flathead screwdriver.

To remove a management module from the chassis, perform the following tasks.

1. Refer to "Installation precautions" on page 106.
2. If your Brocade chassis does not have redundant management modules, power down the chassis and remove the power cables from the chassis power supplies.
3. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located on the chassis front.
4. Use a #2 Phillips-head or flathead screwdriver to loosen and remove the two screws on the ends of the module.
5. Pull the card ejectors towards you, and away from the module front panel. This action unseats the module from the backplane.
6. Pull the module out of the chassis, and place in an anti-static bag for storage if desired.
7. Install a new module in the slot. For information about performing this task, refer to "Installing a new management module".

Installing a new management module

Before installing a module into the chassis, have the following on hand:

- A new management module, which you can order from Brocade.
- An ESD wrist strap with a plug for connection to the ESD connector on the chassis.

DANGER

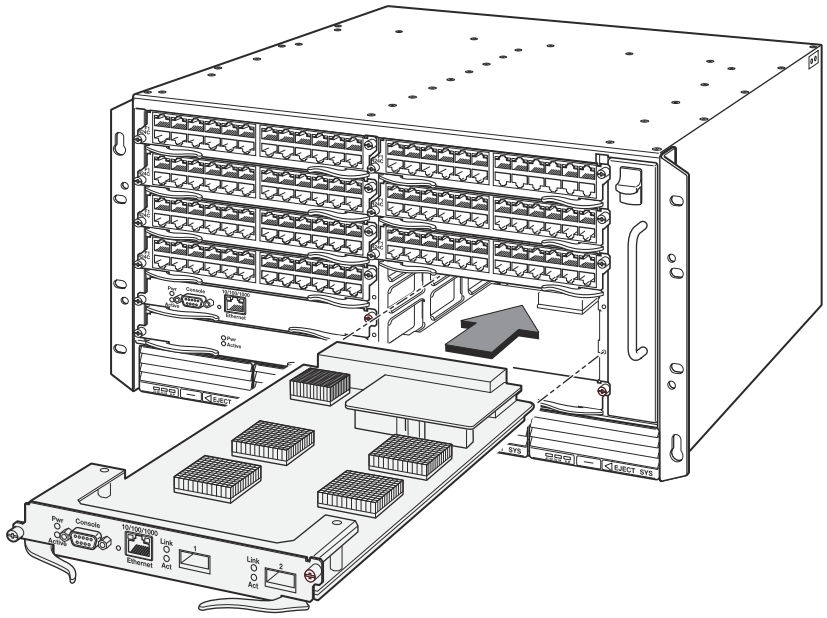
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

- A #2 Phillips-head or flathead screwdriver.

To install a new management module in the chassis, perform the following tasks.

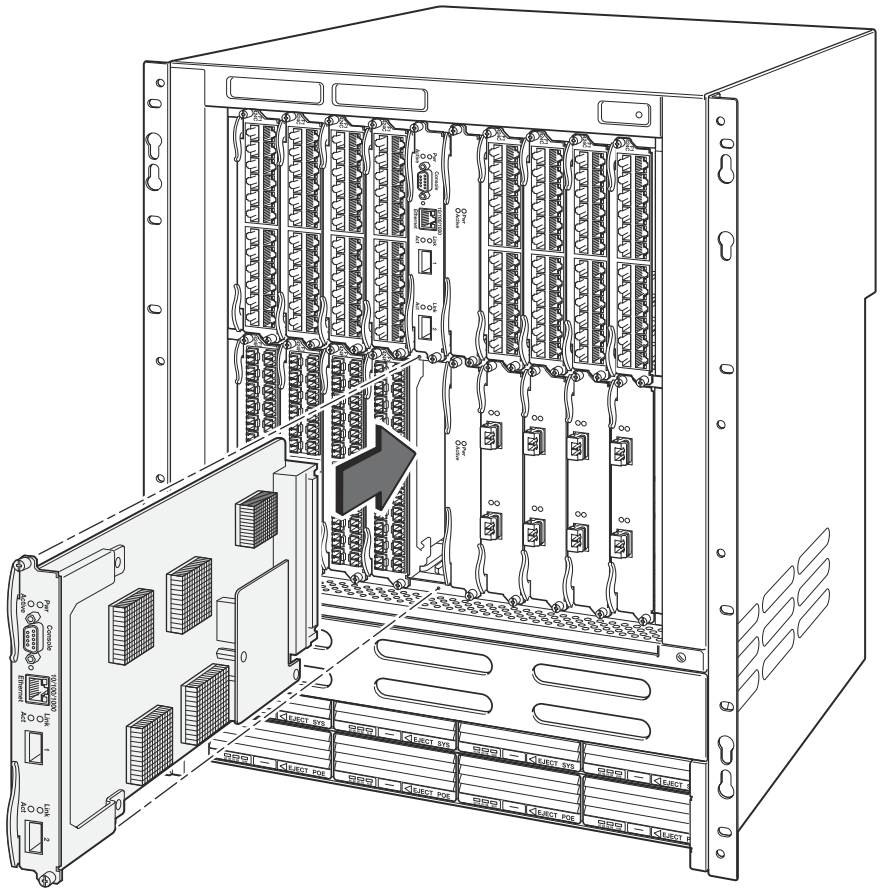
1. Refer to "Installation precautions" on page 106.
2. If your Brocade chassis does not have redundant management modules, power down the chassis and remove the power cables from the chassis power supplies.
3. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located on the chassis front.
4. Remove the new management module from its packaging.
5. Insert the module into the chassis slot as shown in Figure 7 and Figure 47, and slide the card along the card guide until the ejectors on either side of the module move close to the module front panel.
6. Push the ejectors toward the center of the module. This action will fully seat the module in the backplane.
7. Use a #2 Phillips-head or flathead screwdriver to tighten the two screws at either end of the management module's front panel.

FIGURE 47 Installing a management module in the FSX 800 chassis



1 Management module

FIGURE 48 Installing a management module in the FSX 1600 chassis



1 Management module

Replacing a switch fabric module (FSX 800 and FSX 1600 only)

This section provides information about the following tasks:

- Removing a switch fabric module
- Installing a new switch fabric module

NOTE
The switch fabric module is dedicated, which means that you must install it in the FSX 800 or FSX 1600 chassis only. If you attempt to install the switch fabric module in the FSX or another Brocade chassis, the chassis and module will not function properly.

Removing a switch fabric module

You can remove a switch fabric module from the chassis while it is powered on and running.

Before removing a switch fabric module from the chassis, have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the chassis.

DANGER

For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

- A #2 Phillips-head or flathead screwdriver.

To remove a switch fabric module from the chassis, perform the following tasks.

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the lower right corner of the chassis front.
2. Use a #2 Phillips-head or flathead screwdriver to loosen and remove the two screws on the ends of the module.
3. Pull the card ejectors towards you and away from the module front panel. This action unseats the module from the backplane.
4. Pull the module out of the chassis, and place in an anti-static bag for storage if desired.
5. Install a new module in the slot as instructed in the following section.

Installing a new switch fabric module

You can install a switch fabric module in the chassis while it is powered on and running.

Before installing a switch fabric module into the chassis, have the following on hand:

- A new switch fabric module, which you can order from Brocade.
- An ESD wrist strap with a plug for connection to the ESD connector on the chassis front.

DANGER

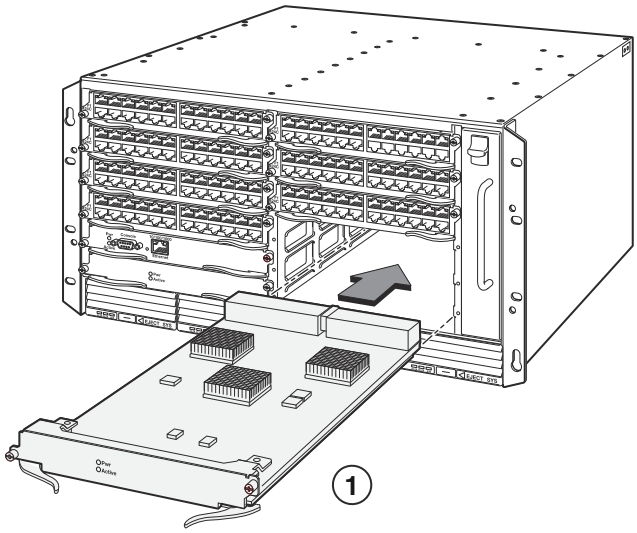
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

- A #2 Phillips-head or flathead screwdriver.

To install a new switch fabric module in the chassis, perform the following tasks.

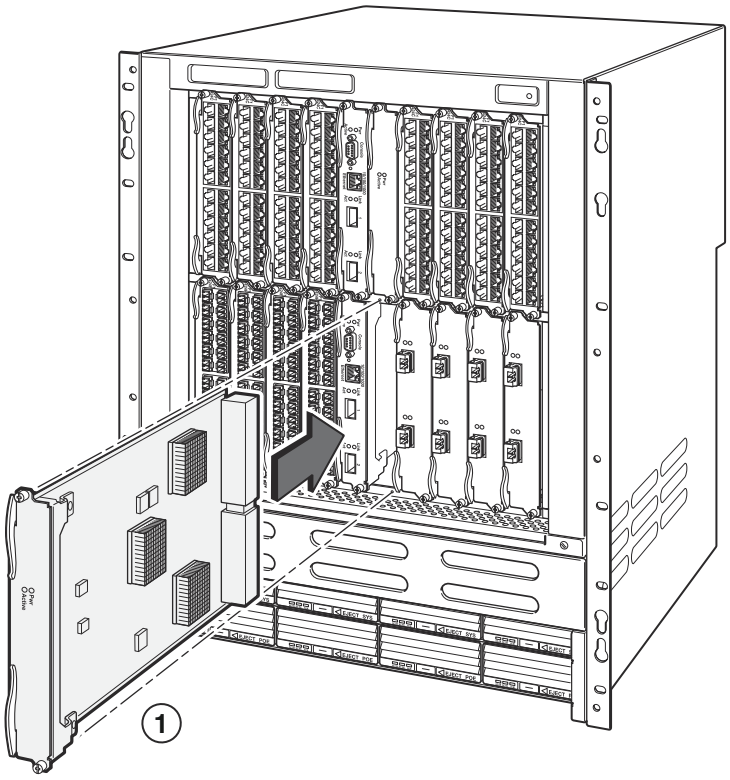
1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the lower right corner of the chassis front.
2. Remove the new switch fabric module from its packaging.
3. Insert the module into the chassis slot as shown in Figure 49 and Figure 50, and slide the card along the card guide until the ejectors on either side of the module move close to the module front panel.
4. Push the ejectors toward the center of the module. This action will fully seat the module in the backplane.
5. Use a #2 Phillips-head or flathead screwdriver to tighten the two screws at either end of the switch fabric module's front panel.

FIGURE 49 Installing a switch fabric module in the FSX 800



1 Switch Fabric module

FIGURE 50 Installing a switch fabric module in the FSX 1600



1 Switch Fabric module

Replacing an interface module

You can remove an interface module and replace it with a new one while the chassis is powered on and running.

NOTE
Interface modules are interchangeable among all FastIron X Series devices. However, if you install them in a Brocade device other than a FastIron X Series device, the device and interface modules will not function properly.

This section provides information about the following tasks:

- General precautions
- Removing an interface module
- Installing a new interface module

Precautions

Note the following when removing and replacing Interface modules:

- If you remove an interface module without first disabling it, the chassis will reboot (reload the software).
- You do not need to enable an interface module after inserting it in the chassis. The *FastIron X Series* chassis device automatically enables the module when you insert it into a live chassis or when you power on the chassis.
- You cannot mix IPv4 and IPv6 modules together in the same chassis.
- The software does not allow simultaneous insertion of multiple interface modules. After inserting an interface module, wait a few seconds before inserting the next module. If you attempt to insert modules one right after the other, the system will display an error message.
- If you plan to replace the removed module with a different type of module, you must remove the module configuration. To do so, enter the **no module** <*slotnum*> command at the global CONFIG level of the CLI. If you attempt to insert a module of a different type without first removing the previous module configuration, the system will display an error message.

Before removing an interface module

Before physically removing an interface module, Have the following tools on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the chassis.

DANGER
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

- A #2 Phillips-head or flathead screwdriver.

CAUTION

It is recommended that modules be disabled through the CLI before removal from the chassis. If the operator wishes to remove the module without first disabling the module, the Enhanced Hot Swap capability in software Release 03.2.00 and later supports this procedure for the FSX 800 and FSX 1600 chassis. Enhanced Hot Swap (that is, no CLI disable) should be performed during a maintenance window. On rare occasions, an Enhanced Hot Swap may result in a software reload of the system. The likelihood of this event is very low.

It is important to wait a minimum of 10 seconds between the removal and insertion of a line module. Re-insertion of a line module less than 10 seconds after the removal of a line module may result in the line module not being properly recognized.

Removing an interface module

To remove an interface module, first perform the steps in section "Before removing an interface module" on page 112, then complete the following steps.

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the lower right corner of the chassis front.
2. Use the #2 Phillips-head or flathead screwdriver to loosen the two screws on the ends of the module.
3. Pull the card ejectors towards you, and away from the module front panel. This action unseats the module from the backplane.
4. Pull the module out of the chassis, and place in an anti-static bag for storage if desired.
5. If you plan to replace the removed module with a *different type* of module, you must first remove the module configuration. To do so, enter the **no module <slotnum>** command at the global CONFIG level of the CLI, then save the configuration to flash memory. For example,

```
Brocade(config)# no module 4
Brocade(config)# exit
Brocade# write mem
```

NOTE
If you attempt to insert a module of a different type without first removing the previous module configuration, the system will display an error message.

6. Install a new module in the slot. For information about performing this task, refer to "Installing a new interface module".

CAUTION

If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Installing a new interface module

You can install an interface module in the FSX 800 and FSX 1600 chassis while the chassis is powered on and running.

NOTE
Interface modules are interchangeable among all FastIron X Series devices. However, if you install them in a Brocade device other than a FastIron X Series device, the device and interface modules will not function properly.

DANGER

For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

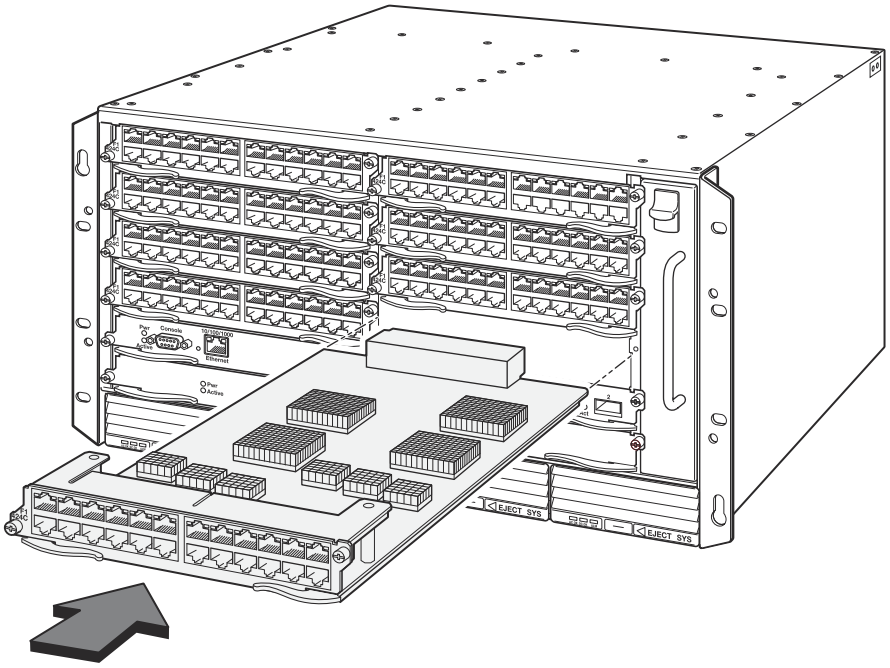
- A #2 Phillips-head or flathead screwdriver.

To install a new interface module in the chassis, perform the following tasks.

1. Follow the preparation procedure in the section "Before removing an interface module" on page 112.
2. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the lower right corner of the chassis front.
3. Remove the module from its packaging.
4. Insert the module into the chassis slot as shown in Figure 51, and slide the card along the card guide until the ejectors on either side of the module move close to the module front panel.
5. Push the ejectors in toward the center of the module. This action will fully seat the module in the backplane.
6. Use a #2 Phillips-head or flathead screwdriver to tighten the two screws at either end of the module front panel.

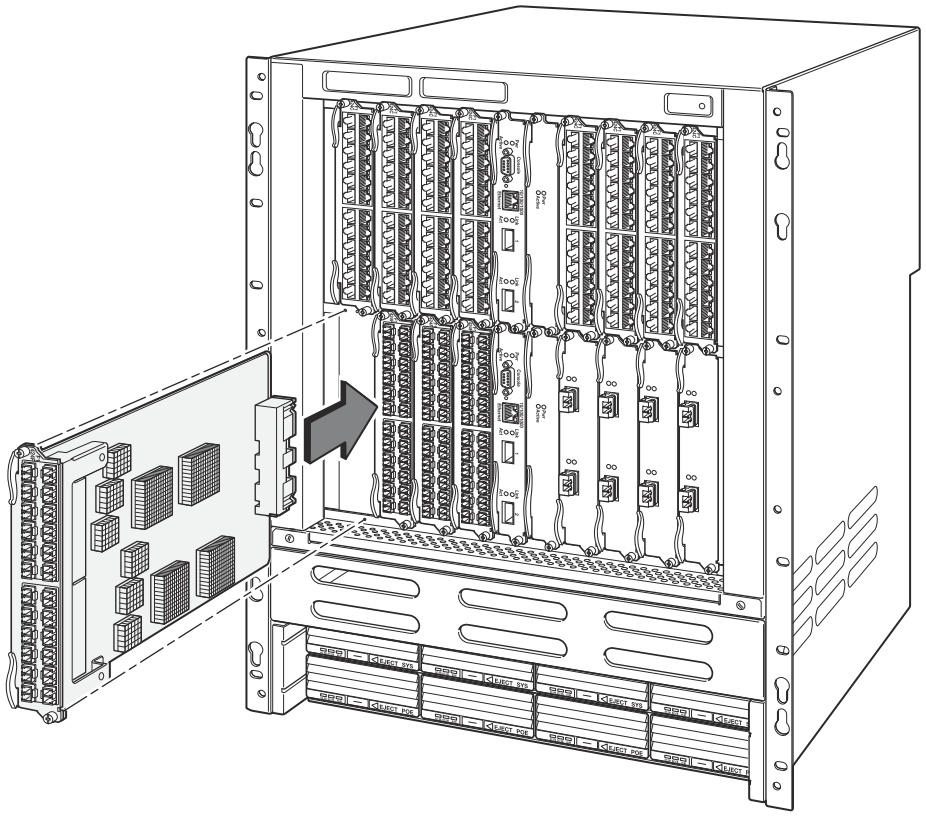
NOTE
You do not need to enable an interface module after inserting it in the chassis. The *FastIron X Series* chassis device automatically enables the module when you insert it into a live chassis or when you power on the chassis.

FIGURE 51 Installing an interface module in the FSX 800 chassis



1 Interface module

FIGURE 52 Installing an interface module in the FSX 1600 chassis



1 Interface module

Disabling and re-enabling an interface module

NOTE
This section does not apply to the active management module. The **disable module** and **enable module** commands are not applicable to the active management module. If you attempt to remove the management module while the chassis is powered on and running, all traffic being handled by the system will stop.

Before removing an interface module from the chassis while the chassis is powered on and running, disable the module first. Disabling the module before removing it prevents a brief service interruption on other forwarding modules. The brief interruption can be caused by the chassis re-initializing other modules in the chassis when you remove an enabled module.

To disable a module, enter a command such as the following at the Privileged EXEC level of the CLI.

```
Brocade# disable module 3
```

This command disables the module in slot 3.

Syntax: disable module <*slot-num*>

The <*slot-num*> variable specifies a valid slot number.

If you decide after disabling a module that you do not want to remove the module, re-enable the module using the following command.

```
Brocade# enable module 3
```

Syntax: enable module <*slot-num*>

Installing or replacing a POE daughter card

This section provides instructions for installing or replacing a Power Over Ethernet (POE) daughter card (part number SX-24GCPOE) in the *FastIron X Series* chassis. The POE daughter card enables support for POE power-consuming devices. The card is located in a connector slot on the 24-port Gigabit Ethernet copper interface module.

NOTE
These instructions apply to the SX-FI424C, SX-FI424P, SX-FI624C and SX-FI624P modules.

You can install or replace a POE daughter card while the chassis is powered on and running. Before installing or replacing the card, disable the module to prevent the remaining interface modules in the chassis from dropping user packets.

NOTE
If applicable, install the POE (48V or 220V) power supply prior to installing the POE daughter card. The system will not recognize the POE daughter card unless there is a POE power supply operating in the chassis. Refer to "Installing or replacing a power supply" on page 122.

To perform this task, you must have the following on hand:

- A POE daughter card, which you can order from Brocade.
- An ESD wrist strap with a plug for connection to the ESD connector on the chassis.

DANGER
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

- A #2 Phillips-head or flathead screwdriver.

To replace or install the POE daughter card, complete the following tasks.

1. Disable the 24-port Gigabit Ethernet module for which you will replace or install the POE daughter card. Enter a command such as the following at the Privileged EXEC level of the CLI.

   ```
   Brocade# disable module 1
   ```

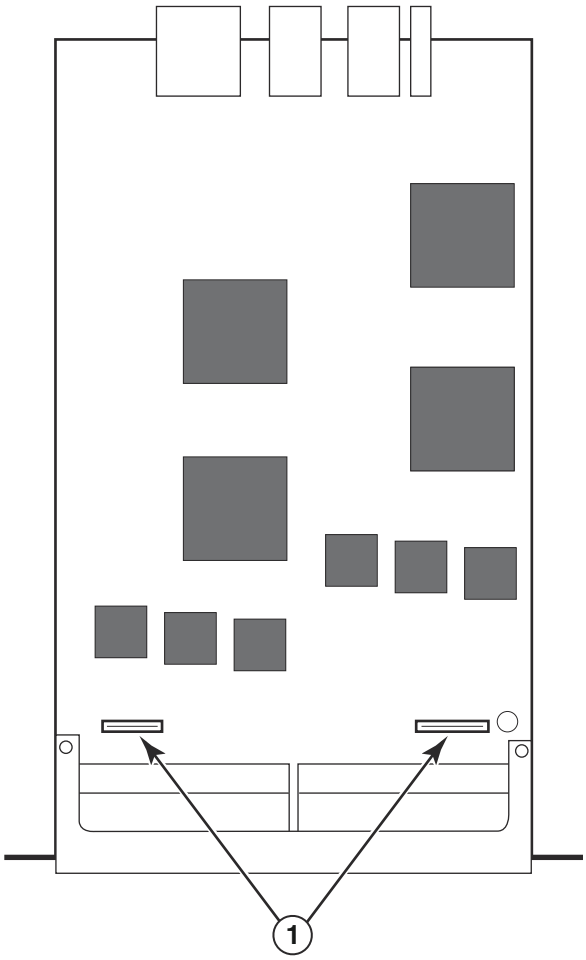
   Syntax: disable module <*slot num*>

2. Remove the 24-port Gigabit Ethernet module from the chassis as follows:
   - Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located on the chassis front.
   - Use the #2 Phillips-head or flathead screwdriver to loosen and remove the two screws on the left and right ends of the 24-port module.

- Pull the card ejectors on the 24-port module toward you and away from the module front panel. This action unseats the module from the backplane.
- Slide the module out of the chassis and place it on a static-free work area.

3. If you are replacing the POE daughter card, remove the existing card from the connector slots on the 24-port module. Figure 55 shows the location of the POE daughter card.
4. Install the new POE daughter card:
   - Locate the connector slots for the POE daughter card on the 24-port module (refer to Figure 53).

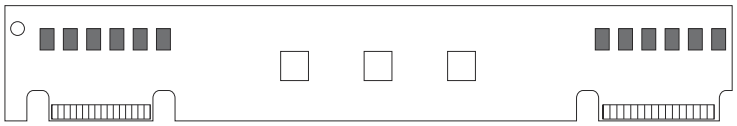
FIGURE 53 Connector slots for POE daughter card



1 Connector slots

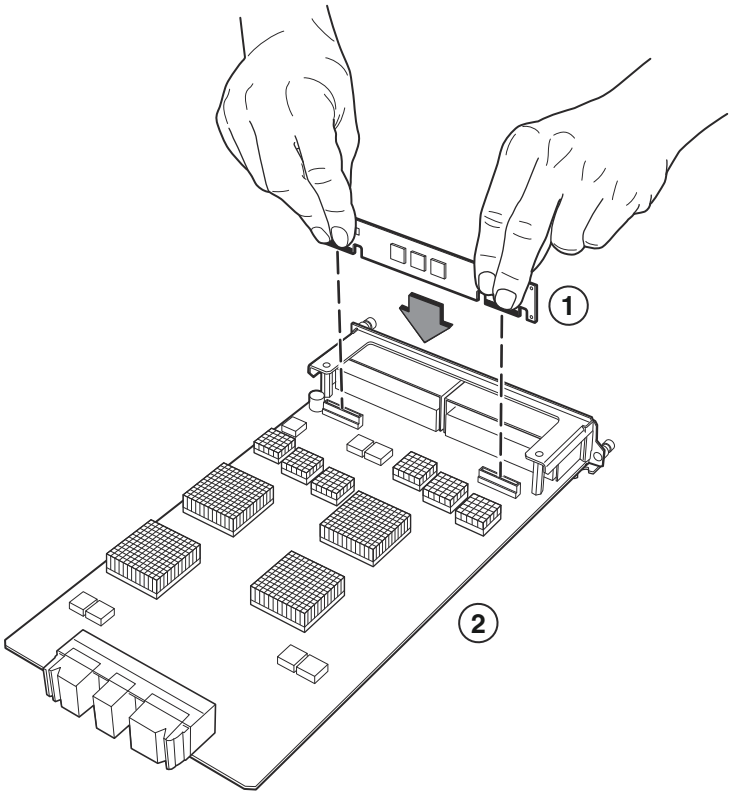
- Remove the POE daughter card from its packaging. The POE daughter card is keyed to prevent improper insertion, as shown in Figure 54.

FIGURE 54 POE daughter card



- Insert the POE daughter card into the connector slot on the 24-port module as shown in Figure 55.

FIGURE 55 Installing the POE daughter card



1 POE daughter card

2 Line card

5. Re-assemble the device:
   - Gently slide the module back into the chassis until the ejectors on both sides of the module move close to the module front panel.
   - Push the ejectors in towards the center of the module. This action will fully seat the module in the backplane.
   - Use a #2 Phillips-head or flathead screwdriver to tighten the two screws at both ends of the module front panel.
6. Observe the console. The following message will appear.

```
Info:  PoE module detected in slot 1. Initializing....
```

7. Issue the **show module** command. The output should show the following description for the 24-port module on which the POE daughter card is installed.

```
24-port Gig Copper + PoE
```

8. Enable POE and configure POE parameters. Refer to the *FastIron Configuration Guide* for information.

Replacing a copper or fiber optic module

You can remove an SFP, SFP + or XFP from a port and replace it with a new one while the chassis is powered on and running.

This section provides information about the following tasks:

- Removing a copper or fiber optic module
- Installing a new copper or fiber optic module
- Cabling a fiber optic module

Removing a copper or fiber optic module

You can remove a copper or fiber SFP (also called a mini-GBIC), SFP + or an XFP from a port while the chassis is powered on and running.

Before removing a copper or fiber optic module, have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the chassis.

DANGER

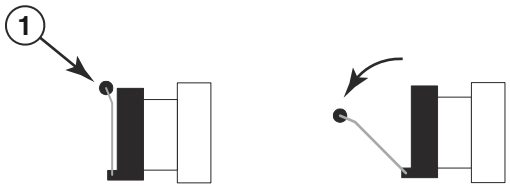
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

- The protective covering that you removed from the copper or fiber optic module when you initially installed the module.

To remove a copper or fiber optic module from a Gigabit Ethernet or 10-Gigabit Ethernet port, perform the following tasks.

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the lower right corner of the chassis front.
2. Disconnect the copper or fiber cable connectors from the port connectors.
3. Insert the protective covering into the port connectors.

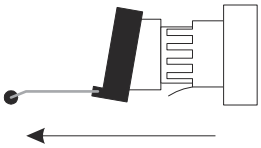
4. Pull the copper or fiber optic module out of the port by pulling the bail latch forward, away from the front panel of the module. This unlocks the module from the front panel.



1 Bail Latch

NOTE
The bail latch may be attached to either the top or the bottom of the mini-GBIC.

5. Grasping the bail latch, pull the copper or fiber optic module out of the port.



6. Store the copper or fiber optic module in a safe, static-free place or in an anti-static bag.
7. Install a new copper or fiber optic module in the port. For information about performing this task, refer to "Installing a new copper or fiber optic module".

Installing a new copper or fiber optic module

You can install a new copper or fiber optic module (SFP, SFP + or XFP transceiver) in a port while the chassis is powered on and running.

NOTE
Some older SFP modules (mini-GBICs for Gigabit Ethernet ports) have latching mechanisms which are larger than the newer parts. These latches could interfere with one another when inserted side by side into an interface module. Avoid using these mini-GBICs side by side in the same module. These older modules are identified by the number PL-XPL-00-S13-22 or PL-XPL-00-L13-23 above the Serial Number. All newer mini-GBICs do not have this limitation.

Before installing one of these modules into the port, have the following on hand:

- A new copper or fiber SFP, SFP + or an XFP transceiver, all of which you can order from Brocade.
- An ESD wrist strap with a plug for connection to the ESD connector on the chassis.

DANGER
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

To install a copper or fiber optic module, perform the following tasks.

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the lower right corner of the chassis front.
2. Remove the new module from its protective packaging.
3. Gently insert the copper or fiber optic module into the port until the module clicks into place. The module is keyed to prevent incorrect insertion.

Cabling a fiber optic module

To cable a fiber optic module, perform the following tasks.

1. Remove the protective covering from the fiber-optic port connectors and store the covering for future use.
2. Before cabling a fiber optic module, Brocade strongly recommends cleaning the cable connectors and the port connectors. For more information, refer to "Cleaning the fiber optic connectors" on page 105.
3. Gently insert the cable connector or connectors (a tab on each connector should face upward) into the port connector or connectors until the tabs lock into place.
4. Observe the link and active LEDs to determine if the network connections are functioning properly. For more information about the LED indicators, refer to Table 22 on page 75.

Installing or replacing a power supply

DANGER

Before beginning the installation, refer to the precautions in "Power precautions and warnings" on page 39.

This section provides information about the following topics:

- Determining which power supply has failed, if necessary
- Replacing an AC power supply
- Replacing a DC power supply
- Connecting power to the chassis
- Verifying proper operation

Determining which power supply failed

To determine which power supply has failed, enter the following command at any CLI command prompt.

```
Brocade# show chassis
```

This command displays status information for the power supplies, as well as information for the fans, and temperature readings for various components in the chassis. The power supplies are numbered in the display. “Power 1” indicates the power supply installed in power supply slot 1, “power 2” indicates the power supply installed in slot 2, and so on. Figure 56 and Figure 57 show the power supply slot numbers.

If the display indicates “Installed (Failed)” for any of the slots, the power supply installed in that particular slot has failed.

FIGURE 56 Power supply placement in the FSX 800

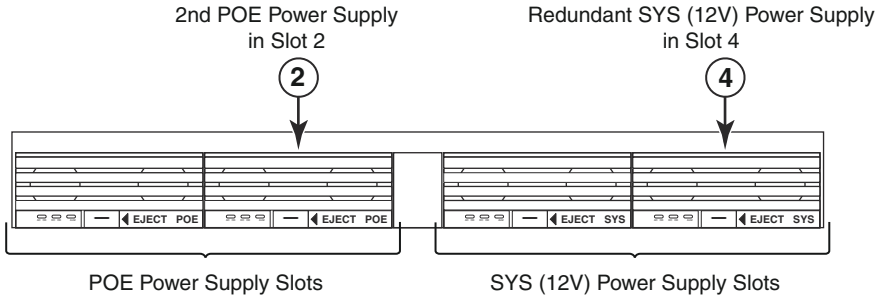
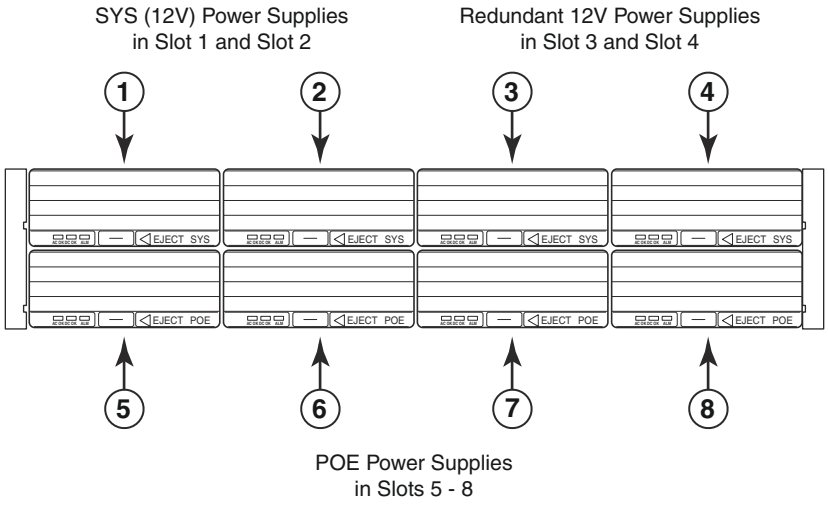


FIGURE 57 Power supply placement in the FSX 1600



Removing an AC power supply

You can order a new AC power supply from Brocade Communications, Inc..

The procedures for removing an AC power supply differ depending on the power supply type (replacement or original). Be sure to refer to the appropriate procedures in this section. For the differences between replacement and original power supplies, refer to “Replacement power supplies” on page 31.

DANGER

The power supplies are hot swappable, which means they can be removed and replaced while the chassis is powered on and running. However, Brocade recommends that you disconnect the power supply from the wall outlet before removing and replacing the supply. The chassis can be running while a power supply is being removed and replaced, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the power supply or other parts of the device could be damaged.

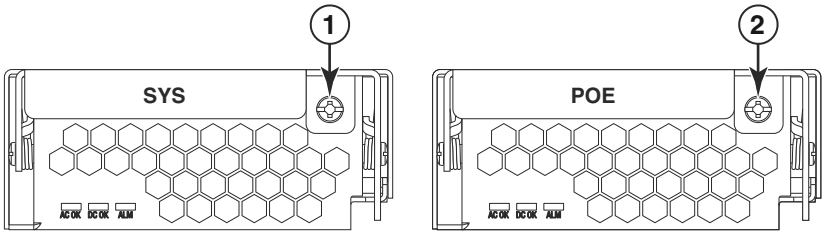
NOTE

Disabling or removing a POE power supply also disables the POE daughter card and associated POE ports.

Removing a replacement power supply

To remove a replacement AC power supply, you need a Phillips-head or a flathead screwdriver.

The following illustration shows the replacement power supplies.



1 Latch retaining screw

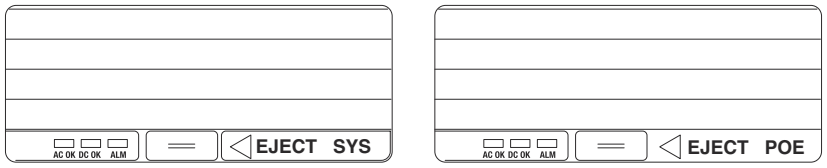
2 Latch retaining screw

To remove a replacement AC power supply, perform the following tasks.

1. Disconnect the power supply's power cord from the wall outlet.
2. Disconnect the power cord from the chassis rear panel.
3. Use a Phillips-head or flathead screwdriver to loosen the latch retaining screw in the front upper right corner of the power supply. Once the screw is loosened, the latch will spring gently forward and down.
4. Gently pull on the power supply latch until the power supply is removed from the chassis.
5. Install a new power supply in the slot. For information about performing this task, refer to "Installing a new power supply" on page 128.

Removing an original power supply

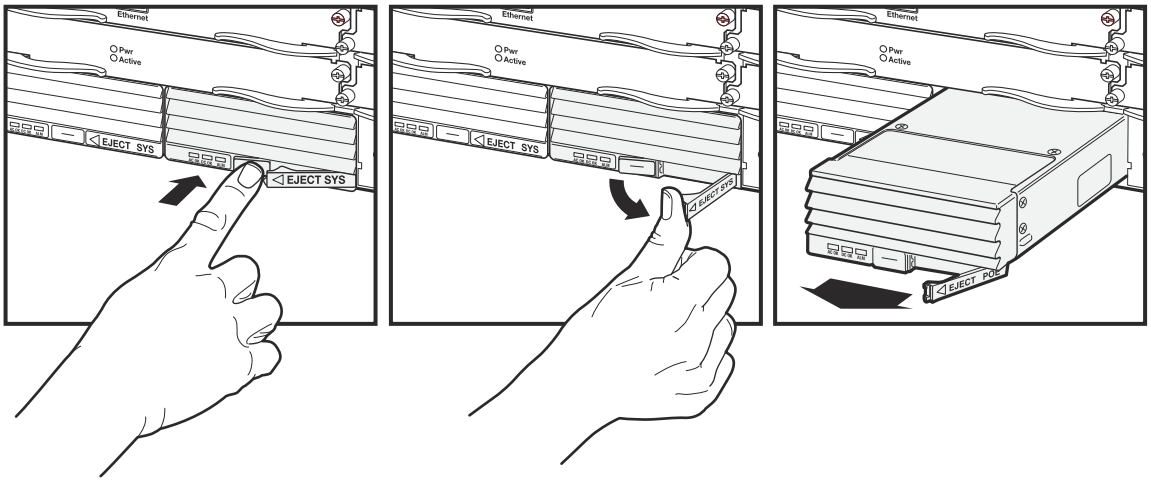
The following illustration shows the original power supplies.



To remove an original AC power supply, perform the following tasks.

1. Disconnect the power supply's power cord from the wall outlet.
2. Disconnect the power cord from the chassis rear panel.
3. Release the latch on the front of the power supply to unlock the power supply from its position in the chassis:
   - Locate the 1/2 in tab (latch release) on the bottom center of the front of the power supply.
   - Firmly press on the latch release.
   - The latch should spring open.
   - Gently push the latch to the right.

1. Push Latch Release In **2.** Push Eject Latch to the Right **3.** Pull Power Supply Out



4. Gently pull on the power supply latch until the power supply is removed from the chassis.
5. Install a new power supply in the slot. For information about performing this task, refer to "Installing a new power supply" on page 128.

Removing a DC power supply

You can order a new DC power supply from Brocade Communications, Inc..

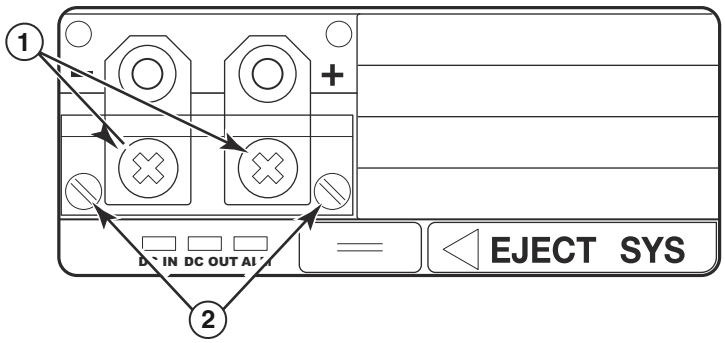
DANGER

The power supplies are hot swappable, which means they can be removed and replaced while the chassis is powered on and running. However, Brocade recommends that you disconnect the power supply from the wall outlet before removing and replacing the supply. The chassis can be running while a power supply is being removed and replaced, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the power supply or other parts of the device could be damaged.

To remove a DC power supply, perform the following tasks.

1. Disconnect the wires to your DC power source.
2. Use a flat-blade screwdriver to remove the two screws holding the transparent cover over the power supply lugs. Refer to Figure 58.

FIGURE 58 DC power supply

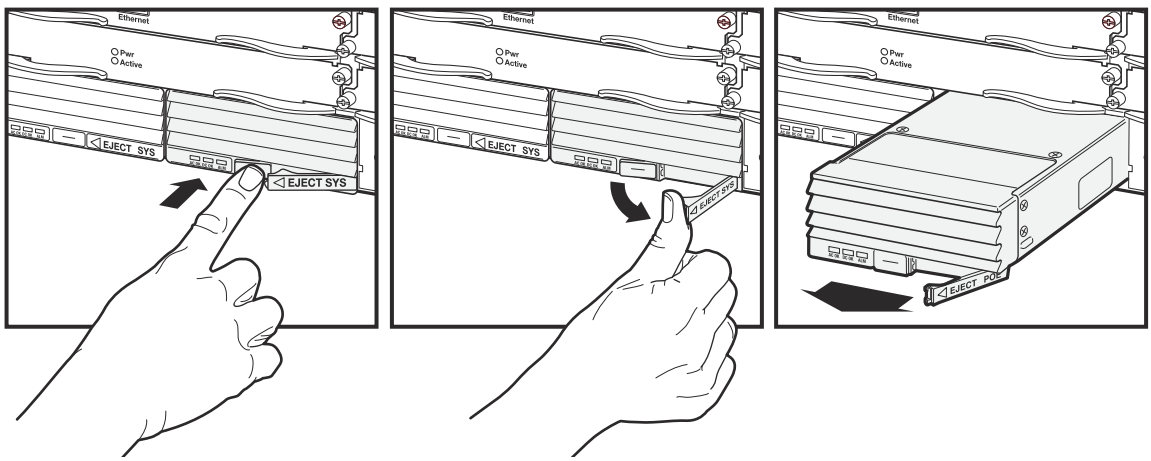


1 Screws holding power lugs

2 Screws holding transparent cover

3. Use a Phillips-head screwdriver to remove each of the power lugs.
4. Remove both wires from the power lugs.
5. Release the latch on the front of the power supply to unlock the power supply from its position in the chassis:
   - Locate the 1/2 in tab (latch release) on the bottom center of the front of the power supply
   - Firmly press on the latch release
   - The latch should spring open
   - Gently push the latch to the right

1. Push Latch Release In **2.** Push Eject Latch to the Right **3.** Pull Power Supply Out



6. Carefully remove the power supply from the chassis.
7. Install a new power supply in the slot. For information about performing this task, refer to "Installing a new power supply" on page 128.

Installing a new power supply

You can order a new power supply from Brocade Communications, Inc..

The procedures for installing a power supply differ depending on the power supply type (replacement or original). Be sure to refer to the appropriate procedures in this section. For the differences between replacement and original power supplies, refer to "Replacement power supplies" on page 31.

DANGER

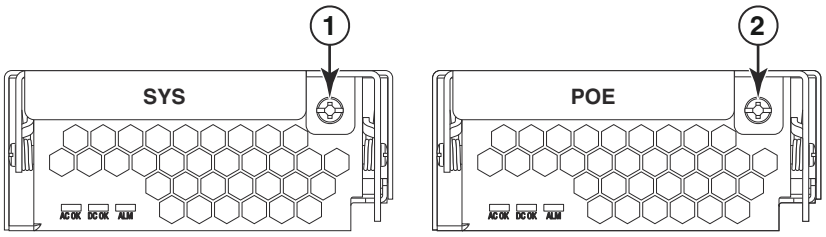
Before beginning the installation, refer to the precautions in "Power precautions and warnings" on page 39.

Installing a replacement power supply

For an overview of replacement power supplies (part numbers 32014-xxx and 32016-xxx), refer to "Replacement power supplies" on page 31.

To install a replacement power supply, you need a Phillips-head or flathead screwdriver.

The following illustration shows the replacement power supplies.



1 Latch retaining screw

2 Latch retaining screw

To install a replacement power supply, perform the following tasks.

1. Use a Phillips-head or flathead screwdriver to loosen the latch screw in the front upper right corner of the power supply. Once the screw is loosened, the latch will spring gently forward and down.
2. Insert the new power supply into the empty power supply slot as shown in Figure 59.

DANGER

Do not attempt to install the power supply without first loosening the retaining screw on the front of the power supply. Attempting to install the power supply with a closed latch will result in mechanical damage to the power supply and power supply slot.

CAUTION

Make sure the power supply is properly inserted in the slot. Never insert the power supply upside down.

3. When the power supply is almost fully seated in the chassis, press firmly on the power supply latch until it locks into place. Refer to Figure 59.

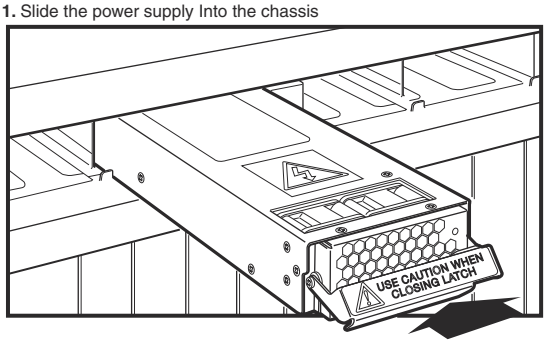
DANGER

Use caution when closing the latch. Your fingers could get caught or pinched between the latch and the front of the power supply.

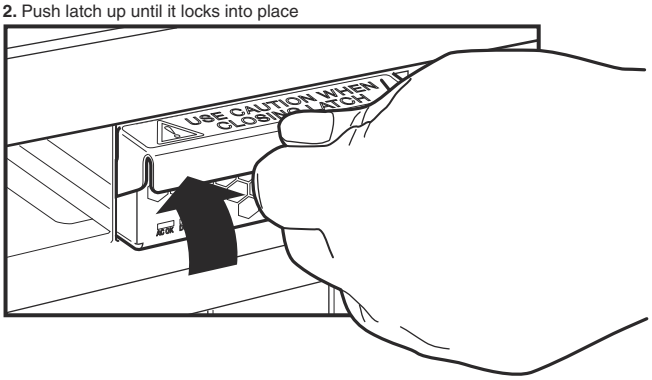
4. When the power supply is fully seated, tighten the retaining screw as shown in Figure 59.
5. Connect power to the chassis. Refer to "Connecting AC power to the chassis" on page 132.

FIGURE 59 Installing a replacement power supply

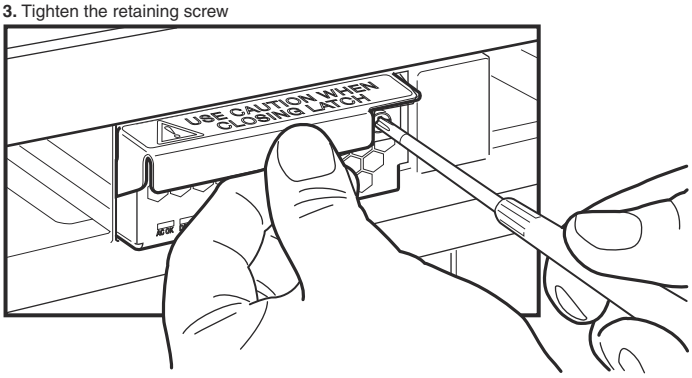
1. Slide the power supply Into the chassis



2. Push latch up until it locks into place



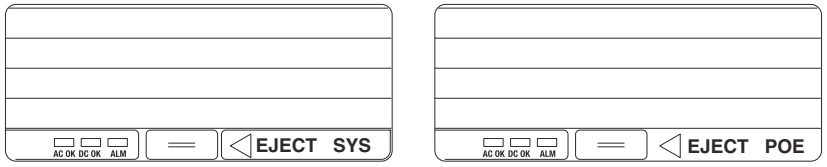
3. Tighten the retaining screw



Installing an original power supply

This section describes how to install an original power supply.

The following illustration shows the original power supplies.



NOTE
For the differences between the replacement and original power supplies, refer to "Replacement power supplies" on page 31.

To install an original power supply, perform the following tasks.

1. Release the latch on the front of the new power supply to unlock it:
    - Locate the 1/2 in tab (latch release) on the bottom center of the front of the power supply
    - Firmly press on the latch release
    - The latch should spring open
    - Gently push the latch to the right

CAUTION
Do not attempt to install the power supply without first releasing the latch on the front of the power supply. Attempting to install the power supply with a closed latch will result in mechanical damage to the power supply and power supply slot.

2. Insert the new power supply into the empty power supply slot.

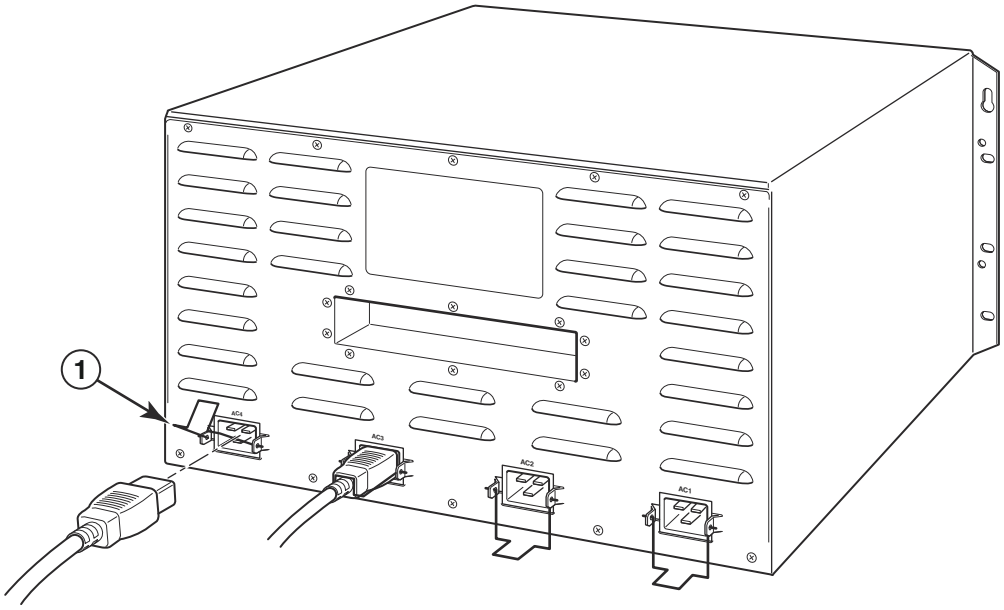
CAUTION
Make sure the power supply is properly inserted in the slot. Never insert the power supply upside down.

3. When the power supply is fully seated, the power supply latch will catch onto a tab located on the right side of the power supply slot. Once the power supply is fully seated, push firmly on the power supply latch until it locks the power supply into place.
4. Connect power to the chassis. Refer to "Connecting AC power to the chassis" on page 132 or "Connecting DC power to the chassis" on page 134.

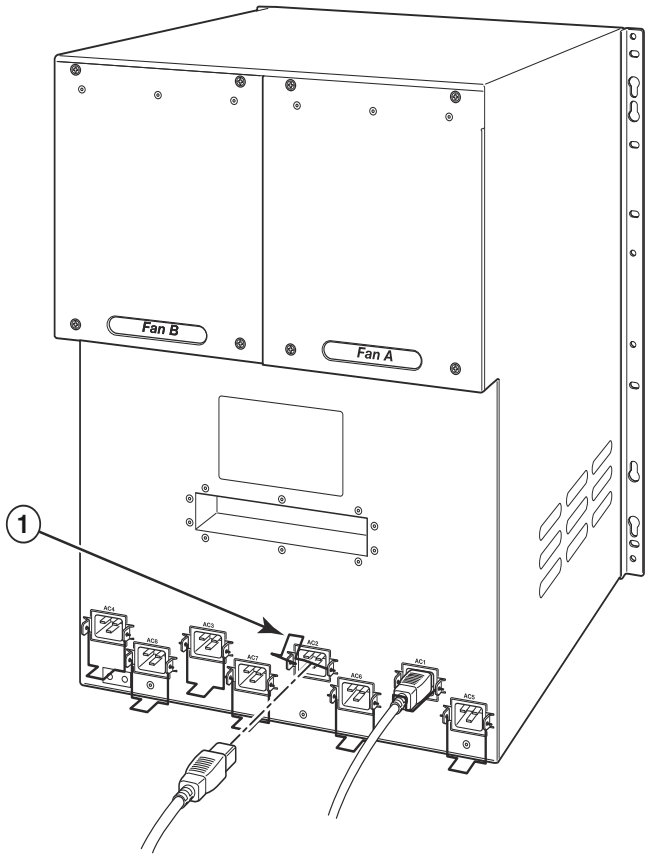
Connecting AC power to the chassis

AC power is supplied though an AC power cord that is installed at the rear of the chassis.

1. At the rear of the chassis, locate the power receptacle where the power supplies have been installed.
2. Lift the cord-retainer and connect a Brocade-supplied AC power cord to the power supply.
3. Snap the cord-retainer over the power plug to hold it in place, as illustrated below.



1 Cord retainer



1 Cord retainer

DANGER

If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

4. Connect the power cord to the wall outlet.
5. Observe the LEDs on the power supply front panel. The AC OK and DC OK LEDs should be green (steady), which indicates the power supply is providing power to the chassis components. If it is amber or OFF, the power supply is not providing power to the chassis components. The ALM LED should be OFF.

Connecting DC power to the chassis

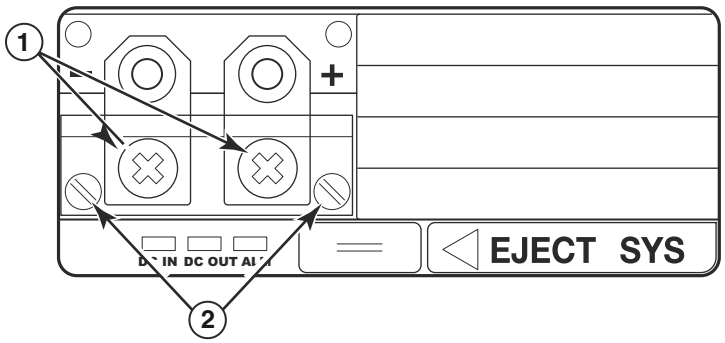
You can use a DC power source for the Brocade chassis. This is supported through use of a DC to DC power supply. DC power must be supplied at 48 V and 30 A.

To perform this task, you need the following items:

- Flathead screwdriver
- Phillips-head screwdriver
- #6 AWG wire (grounding wire)
- #8 AWG wire (input wire)
- Crimping tool

To connect a DC power source, complete the following tasks.

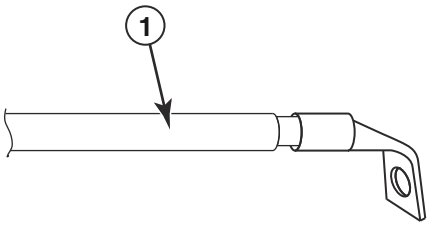
1. Crimp #6 AWG ground wire and connect it to the ground position on the chassis. The ground position is located on the side or rear of the chassis next to the ground symbol. Refer to the illustrations in step 4.
2. Use a flathead screwdriver to remove the two screws holding the transparent cover over the power supply lugs. The following illustration shows the location of the screws and lugs.



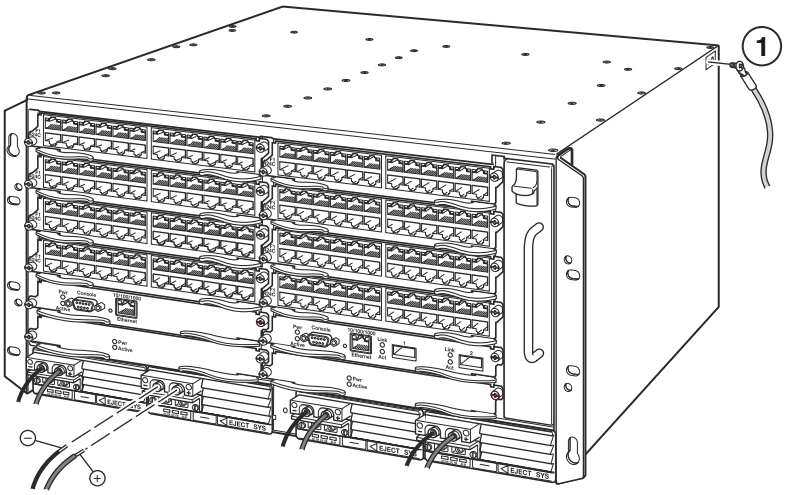
1 Screws holding power lugs

2 Screws holding transparent cover

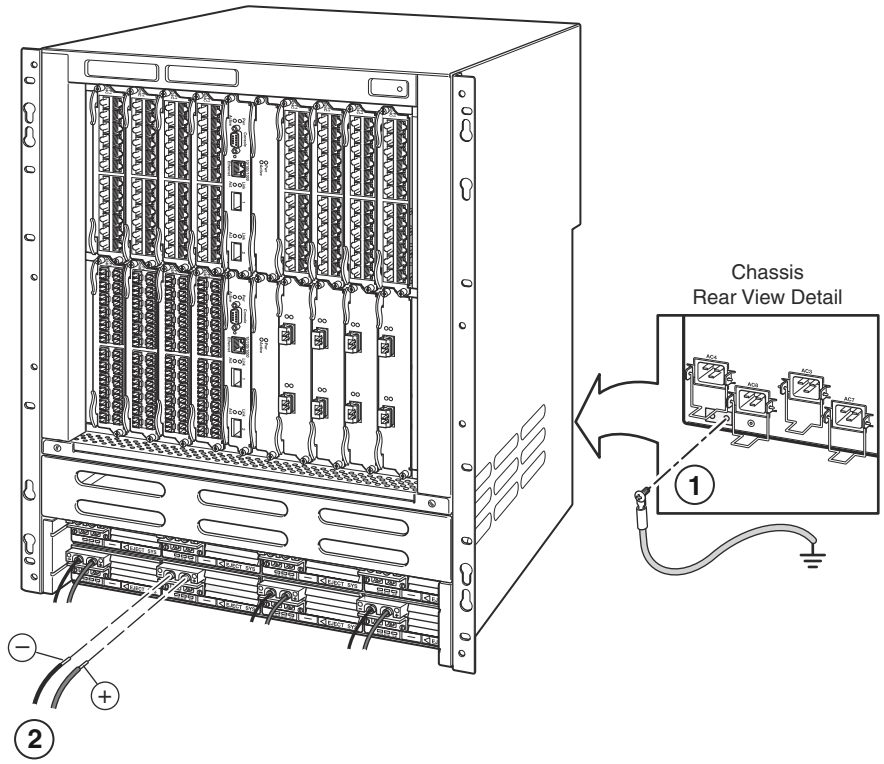
3. Use a Phillips-head screwdriver to remove each of the power lugs.
4. Crimp #8 AWG input wire into the power lugs and reconnect the power lugs to the power supply unit.



1 #8 AWG power supply wire



1 Ground



1 Ground

2 DC power

5. Re-attach the transparent cover that was removed in step 1.
6. Connect the wire to your DC power source making sure to connect the positive and negative supply wires to the correct location as marked on the power supply.
7. Observe the LEDs on the power supply front panel. The DC IN and DC OUT LEDs should be green (steady), which indicates the power supply is providing power to the chassis components. If it is amber or OFF, the power supply is not providing power to the chassis components. The ALM LED should be OFF.

Verifying proper operation

To verify the proper operation of the power supply after power on, you can observe the LEDs on the power supply. Table 27 outlines the LEDs, the desired state of each LED, possible abnormal states of each LED, and what to do if an LED indicates an abnormal state.

TABLE 27 Desired and abnormal power supply LED states after system power on

LED	Desired State	Desired State Meaning	Abnormal State	Abnormal State Meaning or Action
AC OK (AC supply only)	ON – Green (steady)	The power supply is receiving AC power from an AC power source	OFF	The power supply is not receiving power from an AC power source. You can do the following: • Make sure that the power supply cord is connected securely to the wall outlet and the power supply. • Make sure that the wall outlet is rated for 115 or 120V and 20A. If it is not, obtain a cable that is compatibly rated for the outlet. • Make sure that the wall outlet has power.
DC IN (DC supply only)	Green (steady)	The power supply is receiving DC power from a DC power source	OFF	The power supply is not receiving power from a DC power source. You can do the following: • Make sure that the power supply cables are connected securely to the power source and the power supply. • Make sure that the DC power source is 48VDC @ 37.0 A. • Make sure that the power source has power.

TABLE 27 Desired and abnormal power supply LED states after system power on (Continued)

LED	Desired State	Desired State Meaning	Abnormal State	Abnormal State Meaning or Action
DC OUT	ON – Green (steady)	The power supply is supplying DC output power to the chassis	OFF	The power supply is not supplying DC output power to the chassis. If this occurs and the AC OK (AC power supply) or DC IN (DC power supply) LED is Green, then there is a problem with the power supply and it must be replaced.
ALM	OFF	No alarms present and the power supply is in normal operating condition.	Amber	There is an alarm present and the power supply is malfunctioning. Verify the AC or DC input and DC output voltages.

If a problem persists after taking action described in this table, contact Brocade's technical support.

Displaying the status of the power supplies

You can display the status of the power supplies by entering the **show chassis** command at any level of the CLI. The display shows whether a power supply is installed in the specified power supply slot and the status of the power supply, which can be one of the following:

- OK – The power supply is functioning properly and supplying power to the chassis and installed modules.
- Failed – The power supply is not functioning and is not supplying power to the chassis and installed modules.

Replacing the FSX 800 fan tray

The fan tray in the FSX 800 chassis contains six fans and one fan control module. If any of these components fail, you must replace the entire fan tray.

NOTE
The fan tray in the FSX 800 chassis is a non-redundant, hot-swappable fan tray.

NOTE
The FSX 800 chassis should not be left running without a fan tray. This will lead to an increase in the chassis temperature, and can result in a thermal shutdown.

To replace the fan tray, you need the following:

- A new fan tray, which you can order from Brocade
- In addition to the above, you might also need a #2 Phillips-head screwdriver.

DANGER

For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

To replace the fan tray, perform the following tasks.

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the lower right corner of the chassis front.

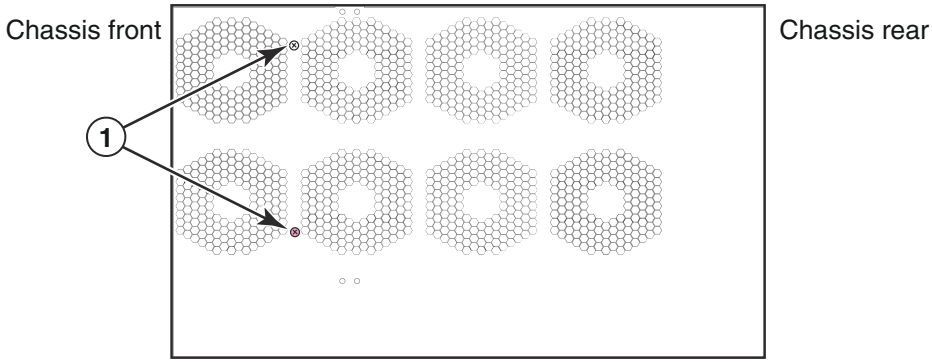
   OR

   Use the ESD strap provided with the fan tray kit. Attach the copper tape end to a bare metal area on the chassis.

2. The FSX 800 ships with two extra screws installed in the right side of the chassis. These screws secure the fan tray, protecting it from damage during shipment. These screws should have been removed during installation. If these screws were not removed during installation, you must remove them before replacing the fan tray. Figure 60 shows the location of the screws.

   To perform this task, you need a #2 Phillips-head screwdriver.

FIGURE 60 Removing the extra screws used for shipment



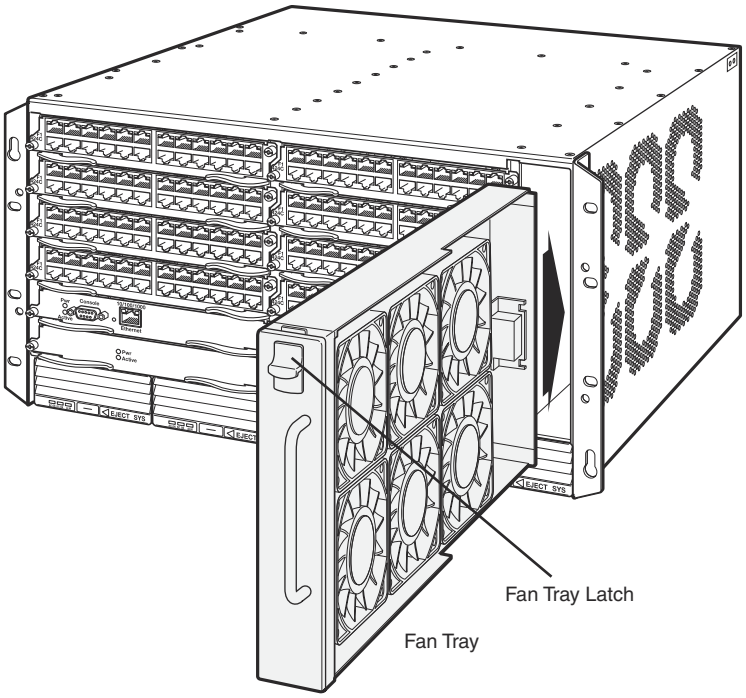
1 Shipping screws

3. Remove the fan tray from the chassis by pressing the fan tray latch inward, towards the center of the fan tray (refer to Figure 61). While pressing the latch inward, gently pull on the handle until the fan connector unfastens from the chassis connector. Once unfastened, pull the fan tray out of the chassis.

DANGER

Be careful not to accidentally insert your fingers into the fan tray while removing it from the chassis. The fans may still be spinning at a high speed.

FIGURE 61 Removing the fan tray



1 Fan Tray Latch

2 Fan Tray

4. Insert the new fan tray into the fan slot and push on the latch until the face plate is flush with the chassis. Pushing the latch in seats the fan connector with the chassis connector.
5. Access the CLI, and enter the **show chassis** command to verify that the new fan is operating normally.

Replacing the FSX 1600 fan assemblies

The FSX 1600 has two fan assemblies, both accessible from the rear. Each assembly has a fan which pulls warm air out of the chassis.

You can remove and replace a fan assembly while the FSX 1600 chassis is powered on and running.

To replace the fan tray, you need the following:

- A new fan assembly, which you can order from Brocade
- An ESD strap (provided with the fan assembly kit) or an ESD wrist strap with a plug for connection to the ESD connector on the chassis.
- In addition to the above, you might also need a #2 Phillips-head screwdriver.

DANGER

For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

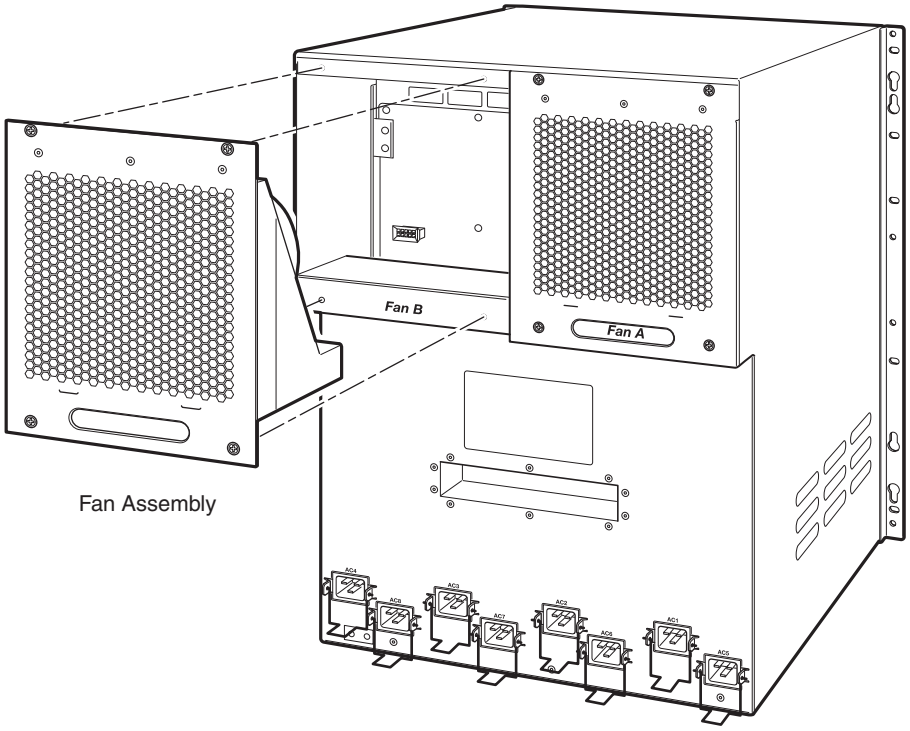
To replace a fan assembly, perform the following tasks.

1. Put on the ESD wrist strap and ground yourself by inserting the plug into the ESD connector located in the top right corner of the chassis front.
2. Using the flathead screwdriver, loosen the four captive screws that secure the fan (marked “Fan A” or “Fan B”) to the back of the chassis.
3. Remove the fan from the chassis by inserting your fingers underneath the fan enclosure and pulling the enclosure toward you as shown in Figure 62. Pulling the enclosure unseats the fan connector from a chassis connector.

DANGER

Be careful not to accidentally insert your fingers into the fan while removing it from the chassis. The fan may still be spinning at a high speed.

FIGURE 62 Removing a fan assembly from the FSX 1600 chassis



1 Fan Assembly

4. Insert the new fan assembly into the fan slot and push the enclosure in until the face plate is flush with the chassis. Pushing the enclosure in seats the fan connector with the chassis connector.

5. Secure the fan to the chassis by tightening the four captive screws.
6. Access the CLI, and enter the **show chassis** command to verify that both fans are operating normally.

Replacing the air filter in the FastIron SX-1600

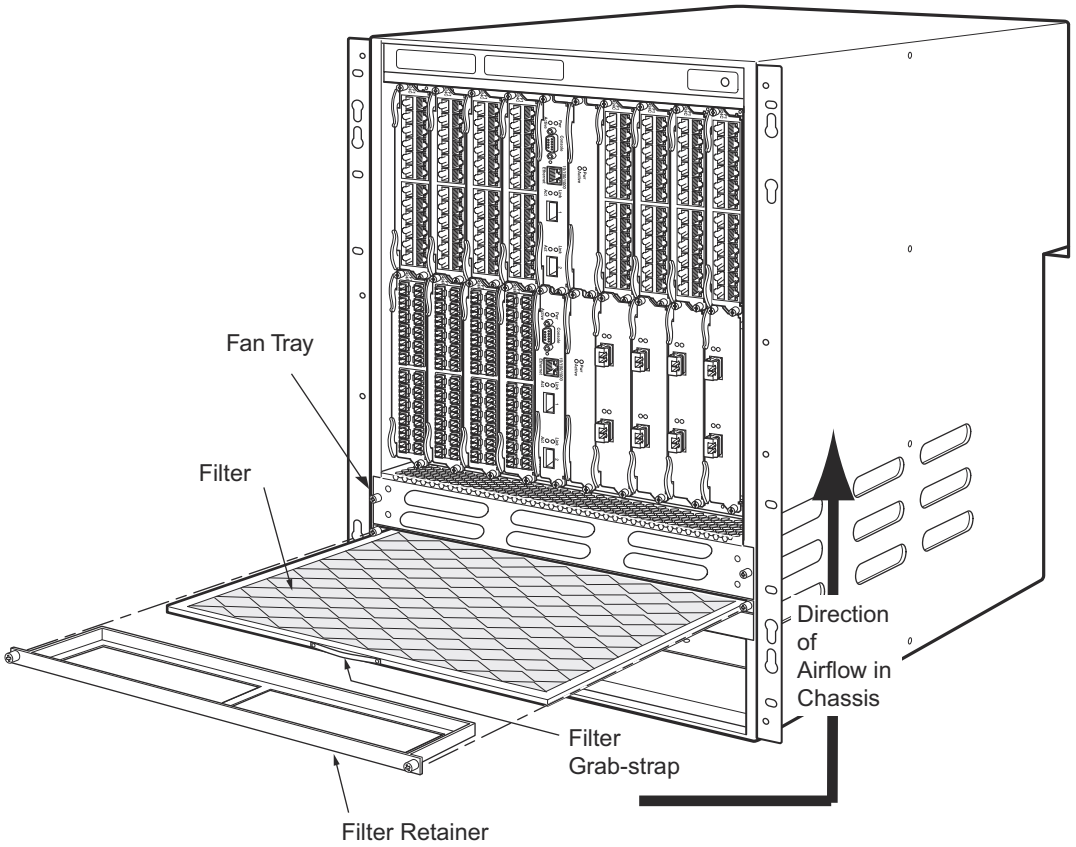
NOTE
It is recommended that Brocade switches and routers be installed in environments that have minimal dust and airborne contaminants. If Brocade switches and routers are placed in operation in environments where dust or other airborne contaminants may be prevalent, air filters should be inspected annually and replaced if needed. Maintaining clean air filters ensures optimal airflow through the device.

To replace the air filter in the FastIron SX-1600, perform the following tasks.

1. Loosen the captive fasteners in the front of the filter retainer.
2. Pull the filter retainer away from the chassis as shown in Figure 63.

   There is a hook on the back of the retainer that is attached to the grab-strap. As you pull the retainer out, the filter is pulled along with it.

FIGURE 63 Air filter removal and replacement for FastIron SX-1600



3. Unhook the filter retainer from the air filter and discard the used filter.

4. Partially insert the replacement air filter (part number 11211-401) by sliding it along the metal guides.

   The filter is marked with an arrow. The arrow indicates how the filter should be installed in regards to the direction of airflow in the chassis. Since air is pulled through the chassis, the arrow must point up towards the fan tray.

5. Attach the hook on the back of the filter retainer to the filter grab-strap.
6. Push the filter retainer into the chassis and tighten the captive fasteners.

Chapter 7

Hardware Specifications

Overview

This chapter contains chassis and power supply specifications for the Brocade Communications, Inc. *FastIron X Series* chassis devices.

Chassis specifications

The following sections present the hardware specifications for the *FastIron X Series* chassis devices.

Physical dimensions

Table 28 lists the physical dimensions and weight for the *FastIron X Series* chassis devices.

TABLE 28 Physical dimensions and weight of the FSX chassis devices

Device	Height	Width	Depth	Weight (fully loaded)
FSX 800	26.6 cm (10.46 in.)	48.3 cm (19 in.) including the mounting brackets 44.3 cm (17.45 in.) behind the mounting brackets	49.5 cm (19.50 in.)	97+ lbs
FSX 1600	62.1 cm (24.46 in.)	44.1 cm (17.38 in.) including the mounting brackets 43.7 cm (17.2 in.) behind the mounting brackets	57.3 cm (22.55 in.)	195.70 lbs

Environmental considerations

For optimal performance, operate or store your Brocade device in compliance with the following environmental conditions.

TABLE 29 Environmental conditions for the chassis

Description	Range
Operating Environment	
Operating temperature	0° – 40° C (32° – 104° F)

TABLE 29 Environmental conditions for the chassis (Continued)

Description	Range
Operating altitude	10,000 feet maximum with the following power supplies: • 32014-*xxx* • 32016-*xxx* 6,600 feet maximum with the following power supplies: • 32004-*xxx* • 32005-*xxx* • 32007-*xxx* • 32008-*xxx* • 32010-*xxx* **NOTE:** The above are manufacturing part numbers, which are inscribed on the power supply (top) labels.
Relative humidity	5 to 95%, non-condensing
Operating noise	Based on ISO 7779 Based on fan and power supply operating noise (refer to "Cooling")
Storage Environment	
Storage temperature	-25° to 70° C (-10° to 158° F)
Storage humidity	95% maximum relative humidity, non-condensing
Storage altitude	0 – 4572 meters (0 – 15,000 feet) maximum

Cooling

The cooling system is contained within the system's fan tray assembly and modules.

FSX 800

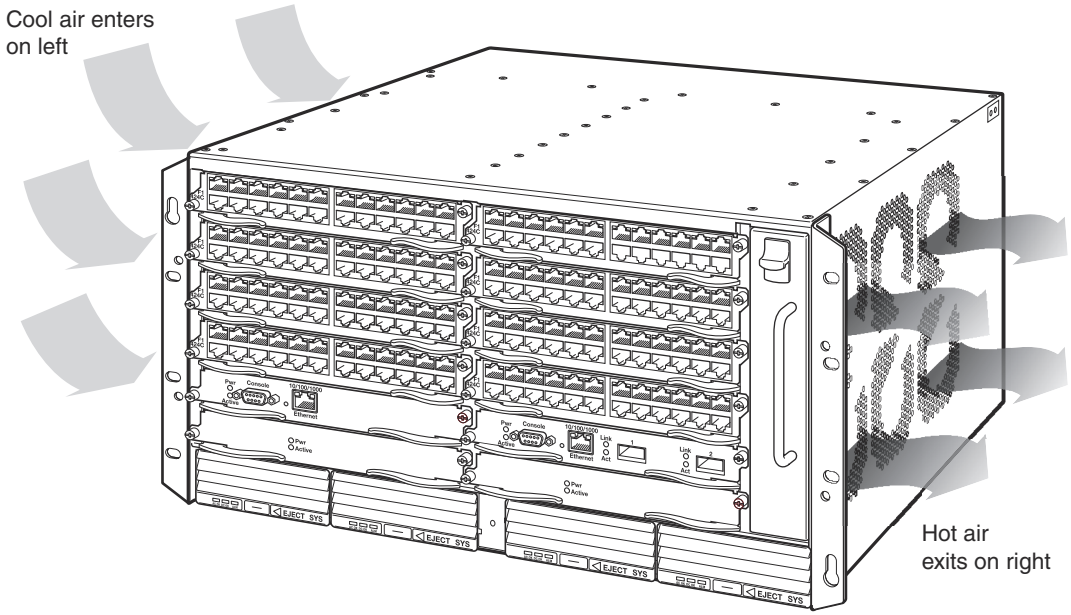
The fan tray in the FSX 800 is located on the right side of the chassis. This position assumes you are facing the front of the chassis, not the rear.

The fans cool the CPU, main memory, and voltage regulators. The fans move the air from the left side of the device to the right side of the device as shown in Figure 64.

- Total air flow: 127 CFM * 6 (qty) = 762 CFM

- Fan operating noise: maximum 67.0 dB

FIGURE 64 Internal airflow in the FSX 800



FSX 1600

The fan trays in the FSX 1600 are located in the top rear of the chassis.

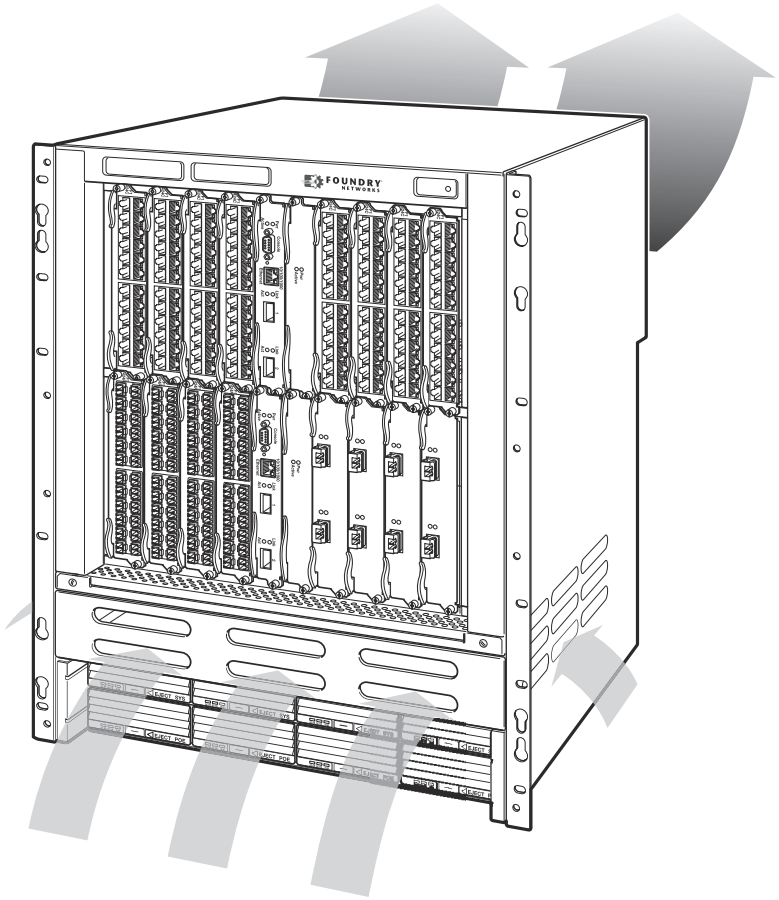
The fans cool the CPU, main memory, and voltage regulators. The fans move the air from the front of the device to the rear of the device, as shown in Figure 65.

Table 30 shows the airflow and acoustic level for each fan speed setting on the FSX 1600 chassis. The noise level varies on each side of the chassis and is highest at the rear of the chassis where the fans are located.

TABLE 30 FSX 1600 chassis fan operating noise

Fan Speed Setting	Airflow (CFM) Exhaust	Acoustic Level (dB)			
		Front	Left	Right	Rear
1	282	59	58	58	65
2	388	65	66	66	72
3	391	65	66	66	72
4	395	65	66	66	72
5	454	68	69	71	78

FIGURE 65 Internal airflow in the FSX 1600



Regulatory compliance

Table 31 lists the Electromagnetic Compatibility (EMC), Immunity standards, and safety agency approvals for the FastIron Chassis.

TABLE 31 Regulatory compliance

Certifications
Emissions • Canada Interference Causing Equipment Regulations • EN 55022 / CISPR-22 Class A / VCCI Class A • FCC Class A **Electromagnetic** • EN 61000-3-2 Power Line Harmonics • EN 61000-4-2 ESD • EN 61000-4-3 Radiated Immunity • EN 61000-4-4 EFT • EN 61000-4-5 Surge • EN 61000-4-6 Low Frequency Common Immunity • EN 61000-4-11 Voltage Dips and Sags Generic: EN 50082-1 • ESD: IEC 61000-4-2; 4 kV CD, 8 kV AD • Radiated: IEC 61000-4-3; 3 V/m • EFT/Burst: IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line) • Conducted: IEC 61000-406; 3 V **Safety Agency** • CAN/CSA-C22.2 No. 60950-1-07 / UL 60950-1 – 2nd Edition, Safety of Information Technology Equipment • EN 60825-1 Safety of Laser Products – Part 1: Equipment Classification, Requirements and User's Guide • EN 60825-2 Safety of Laser Products – Part 2: Safety of Optical Fibre Communications Systems • EN 60950-1 / IEC 60950-1 – Safety of Information Technology Equipment

Maximum power consumption

Table 32 lists the maximum power consumption for the modules and other components in the Brocade chassis.

TABLE 32 Maximum power consumption

Hardware Component[1]	Maximum Power Consumption (Watts)	Maximum Number of Components per Chassis	
		FSX 800	FSX 1600
FSX 800 and FSX 1600 Management Module with 2 10-GbE ports	135	2	2
FSX 800 and FSX 1600 Management Module with no ports	65	2	2
Switch Fabric module in the FSX 800 chassis	45	2	N/A
Switch Fabric module in the FSX 1600 chassis	90	N/A	2
2-port 10-GbE interface module, including fiber optics	90	8	16
2-port (SFP+) 10-Gigabit Ethernet interface module	75	8	16
8-port (SFP+) 10- Gigabit Ethernet interface module	60	8	16
24-port GbE copper interface module	90	8	16

TABLE 32 Maximum power consumption (Continued)

Hardware Component[1]	Maximum Power Consumption (Watts)	Maximum Number of Components per Chassis	
		FSX 800	FSX 1600
24-port GbE copper interface module with PoE+	90	8	16
24-port GbE fiber interface module, including fiber optics	90	8	16
48-port GbE copper interface module	90	4	8
FSX and FSX 800 fans	20	6	N/A
FSX 1600 fans	80	N/A	2
Maximum Power Consumption in a Fully Loaded, Functional Chassis			
FSX 800	1200	–	–
FSX 1600	2050	–	–

1. For a list of part numbers for the Management and Interface modules, refer to the following:
"Management modules" on page 10
"FSX 800 and FSX 1600 management modules" on page 10
"Interface modules" on page 13

Power source interruptions

Table 33 shows how the FastIron chassis protects against power surges and power drops.

TABLE 33 Chassis power surge and drop protection

Property	Protection Mechanism
Power surge	MOV and Spark Gap protection
Power drop	An AC loss of >15ms will cause the power supply to shut down due to input under-voltage

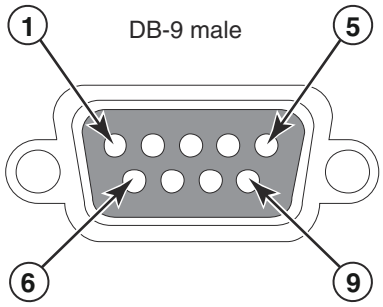
Pinouts and signalling

This section lists the pinouts for the DB-9 connector and RJ-45 port jacks.

Serial (console) port pinouts

The Console port is a standard male DB-9 connector, as shown in Figure 66.

FIGURE 66 Serial port pin and signalling details



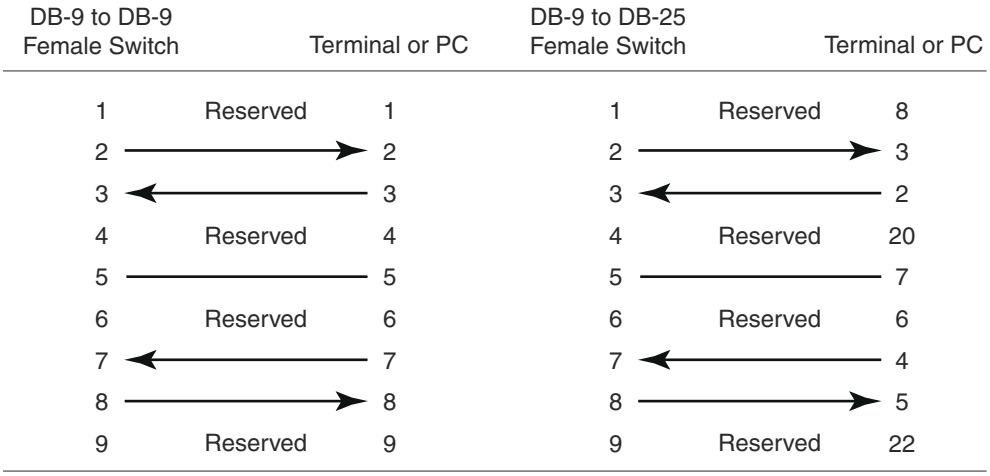
Pin Assignment	Pin Number	Switch Signal
	1	Reserved
	2	TXD (output)
	3	RXD (input)
	4	Reserved
	5	GND
	6	Reserved
	7	CTS (input)
	8	RTS (output)
	9	Reserved

Most PC serial ports require a cable with a female DB-9 connector. However, terminal connections will vary, requiring a cable with either a DB-9 or DB-25 connector, male or female.

Serial cable options between the *FastIron X Series* chassis and a PC or terminal are shown in Figure 67.

NOTE
As indicated in Figure 66 and Figure 67, some of the wires should not be connected. If you do connect the wires that are labelled “Reserved”, you might get unexpected results with some terminals.

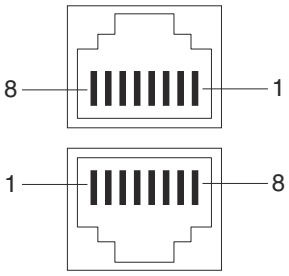
FIGURE 67 Console port pin assignments showing cable connection options to a terminal or PC



10/100 and gigabit port pinouts

Figure 68 lists the pin assignments and signalling for 1000Base-T ports.

FIGURE 68 Pin assignment and signalling for 10/100Base-TX and 1000Base-T ports

Pin Assignment	10BaseT Pin Number	10BaseT MDI-X ports	100BaseTX and 1000BaseT Pin Number	100BaseTX and 1000BaseT MDI-X ports
	1	RD+	1	RD+
	2	RD-	2	RD-
	3	TD+	3	TD+
	4	Not used	4	CMT
	5	Not used	5	CMT
	6	TD-	6	TD-
	7	Not used	7	CMT
	8	Not used	8	CMT

Cable specifications

Table 34 lists the specifications for the cables used with the 10/100, Gigabit, and 10-Gigabit Ethernet ports.

NOTE
Cable installation and network configuration will affect overall transmission capability. The numbers provided below represent the accepted recommendations of the various standards. For network-specific recommendations, consult your local Brocade reseller or system engineer.

TABLE 34 Cable length summary table

	Cable Type[1]	Connector Type	Core Diameter (microns)	Modal Bandwidth (MHz*km) or Wavelength (nm)	Range (meters)
1000Base-BX-D	Single-mode Fiber (SMF)	LC connector for SFP module	9	1490 nm	2 – 10000 (10km)
1000Base-BX-U	SMF	LC connector for SFP module	9	1310 nm	2 – 10000 (10km)
1000Base-LHA	SMF	LC connector for SFP module	9	1550 nm	2 – 70000 (70km)
1000Base-LHB	SMF	LC connector for SFP module	9	1550 nm	2 – 120000 (120km)
1000Base-LX	Multi-mode Fiber (MMF)	LC connector for SFP module	62.5	500	2 – 550
	MMF		50	400	2 – 550
	MMF		50	500	2 – 550
	SMF		9	1300 nm	2 – 10000
1000Base-SX	MMF	LC connector for SFP module	62.5/125	200	.5 – 275
	MMF		62.5/125	500	.5 – 550
	MMF		50/125	900	.5 – 595
	MMF		50/125	1500	.5 – 740
	MMF		50/125	2000	.5 – 860
1000Base-SX 2	MMF	LC connector for SFP module	62.5	500	up to 2000 (2 km)
1000Base-T	Copper	RJ-45 jack for standard unshielded twisted pair (UTP or Category 5)	n/a	n/a	up to 100 meters
100Base-BX	SMF	LC connector for SFP module	9	1310/1490	10000 (10 km)
100Base-FX-SR	MMF	LC connector for SFP module	62.5	500	up to 2000 (2 km)
100Base-FX-IR	SMF	LC connector for SFP module	9	1310	up to 15000 (15 km)

TABLE 34 Cable length summary table (Continued)

	Cable Type[1]	Connector Type	Core Diameter (microns)	Modal Bandwidth (MHz*km) or Wavelength (nm)	Range (meters)
100Base-FX-LR	SMF	LC connector for SFP module	9	1310	up to 40000 (40 km)
100Base-TX	Copper	RJ-45 jack for standard unshielded twisted pair (UTP or Category 5)	n/a	n/a	up to 100 meters
10GBase-1310	MMF	LC connector for XFP module	9	1310 nm	up to 200 meters
10GBase-CX4	Copper	CX4 connector for XFP module	n/a	n/a	up to 15 meters
10GBase-ER	SMF	LC connector for XFP module	9	1550 nm	up to 40000 (40 km)
10GBase-LR	SMF	LC connector for XFP module	9	1310 nm	2 – 10000 (10km)
10GBase-SR	MMF	LC connector for XFP module	62.5/125	160	2 – 26
			62.5/125	200	2 – 33
			50/125	400	2 – 66
			50/125	500	2 – 82
			50/125	2000	2 – 300
10GBase-ZR	SMF	LC connector for XFP module	9	1550 nm	up to 80000 (80 km)
10GBase-ZRD	SMF	LC connector for XFP module	9	1530.33 – 1561.42 nm	up to 80000 (80 km)

1. SMF = Single Mode Fiber, MMF = Multi-Mode Fiber

Power cords

All of the FastIron devices ship with US-compatible power cords unless otherwise specified at the time of order. United Kingdom- and European-compatible power cords are also available.

Refer to "Input connector and plug" on page 155.

Power supply specifications

This section contains the following information for the power supplies that ship with the *FastIron X Series* chassis devices:

- "Physical dimensions and weight"
- "Environmental considerations"
- "Electrical specifications"
- "Input connector and plug"
- "DC power cables for SX-DCPWR-SYS and SX-DCPWR-POE power supplies Regulatory compliance"
- "Safety warnings"

For an overview of the power supplies, refer to "Power supplies" on page 27.

Physical dimensions and weight

Table 35 lists the physical dimensions and weight of the power supplies.

TABLE 35 Physical dimensions and weight of power supplies

Dimensions	Weight
Replacement power supplies SX-ACPWR-SYS and SX-ACPWR-POE (manufacturing part numbers 32014-*xxx* and 32016-*xxx*[1], respectively)	
4.19 cm (H) x 10.17 cm (W) x 38.10 cm (D) 1.65 in. (H) x 4.00 in. (W) x 15 in. (D)	2.7 kg (6 lbs)
All other power supplies	
4.13 cm (H) x 10.17 cm (W) x 36.19 cm (D) 1.63 in. (H) x 4.00 in. (W) x 14.25 in. (D)	2.7 kg (6 lbs)

1. Manufacturing part numbers are inscribed on the power supply (top) label.

Environmental considerations

TABLE 36 Environmental considerations for power supplies

Property	SX-ACPWR-SYS and SX-ACPWR-POE	SX-DCPWR-SYS and SX-DCPWR-POE	SX-ACPWR2500-POE
Operating Environment			
Operating temperature	-0° to 40° C, 23° to 122° F	-0° to 40° C, 23° to 122° F	-0° to 40° C, 23° to 122° F
Relative humidity	0 – 95%, non-condensing	0 – 95%, non-condensing	0 – 95%, non-condensing

TABLE 36 Environmental considerations for power supplies (Continued)

Operating altitude	10,000 feet maximum for power supplies with the following manufacturing part numbers[1]: • 32014-*xxx* • 32016-*xxx* 6,600 feet maximum for power supplies with the following manufacturing part numbers: • 32005-*xxx* • 32007-*xxx*	up to 6,600 feet above sea level	up to 6,600 feet above sea level
Operating noise	50 dB maximum for power supplies with the following manufacturing part numbers: • 32014-*xxx* • 32016-*xxx* 65 dB maximum for power supplies with the following manufacturing part numbers: • 32005-*xxx* • 32007-*xxx*	50 dB maximum	50 dB maximum
Cooling	two internal fans	one internal fan	two internal fans
Storage Environment			
Storage temperature	-40° to 85° C, -40° to 185° F	-40° to 85° C, -40° to 185° F	-40° to 85° C, -40° to 185° F
Storage humidity	95% maximum, non-condensing	95% maximum, non-condensing	95% maximum, non-condensing
Storage altitude	up to 15,000 feet above sea level	up to 15,000 feet above sea level	up to 15,000 feet above sea level

1. Manufacturing part numbers are inscribed on the power supply (top) labels.

Electrical specifications

Table 37 lists the electrical specifications for the power supplies. The AC power supplies provide single phase electric power.

TABLE 37 Electrical specifications for power supplies

Power Supply[1]	Input voltage range	Input current	Inrush current	Maximum Output	Maximum BTUs per hour
SX-ACPWR-SYS with manufacturing part number 32014-xxx	100 – 240 VAC, 50 – 60 Hz	16 amps at 100 VAC 8 amps at 200 VAC	30 amps peak maximum	1200 watts of total output power	4092
SX-ACPWR-SYS with manufacturing part number 32005-xxx	100 – 240 VAC, 50 – 60 Hz	14.3 amps at 100 VAC 7.1 amps at 200 VAC	30 amps peak maximum	1200 watts of total output power	4092

TABLE 37 Electrical specifications for power supplies (Continued)

Power Supply[1]	Input voltage range	Input current	Inrush current	Maximum Output	Maximum BTUs per hour
SX-ACPWR-POE with manufacturing part number 32016-*xxx*	100 – 240 VAC, 50 – 60 Hz	16 amps at 100 VAC 8 amps at 200 VAC	30 amps peak maximum	1250 watts of total output power 1080 watts of total POE output power	4265
SX-ACPWR-POE with manufacturing part number 32007-*xxx*	100 – 240 VAC, 50 – 60 Hz	13.9 amps at 100 VAC 6.9 amps at 200 VAC	30 amps peak maximum	1250 watts of total output power 1080 watts of total POE output power	4265
SX-DCPWR-SYS	-40 to -60 VDC 48V typical or recommended	24 amps at 40 VDC	45 amps peak maximum	1200 watts of total output power	4092
SX-DCPWR-POE	-40 to -60 VDC 48V typical or recommended	36 amps at 40 VDC	45 amps peak maximum	1250 watts of total output power 1080 watts of total POE output power	4736
SX-ACPWR2500-POE	200 – 240 VAC, 50 – 60 Hz	14 amps at 200 VAC	30 amps peak maximum	2500 watts of total output power 2160 watts of total POE output power	8525

1. Manufacturing part numbers are inscribed on the power supply (top) labels.

Input connector and plug

Table 38 lists the input connectors for the power supplies.

TABLE 38 Input connector for AC power supply

Power Supply	AC Input Connector Properties
SX-ACPWR-SYS and SX-ACPWR-POE	Standard IEC type (IEC320) C20 type: UL/CSA 20A/250V, VDE 16A/250V Orientation: Ground pin down
SX-ACPWR2500-POE	6-20 Connector
SX-DCPWR-SYS and SX-DCPWR-POE	2-position terminal block The power supply is connected to Earth Ground through the power supply chassis.

Figure 69 shows the power plug and connector for the SX-ACPWR-SYS and SX-ACPWR-POE power supplies. The power cord is 2.5 meters in length.

FIGURE 69 AC power cable plug and input connector for SX-ACPWR-SYS and SX-ACPWR-POE power supplies

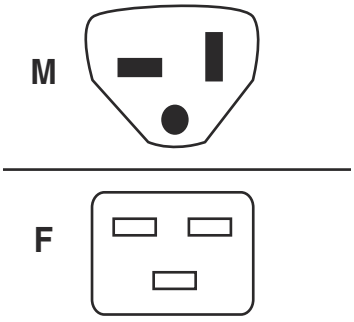


Figure 70 shows the power plug for the SX-ACPWR2500-POE power supply.

FIGURE 70 AC power cable plug for SX-ACPWR2500-POE power supply

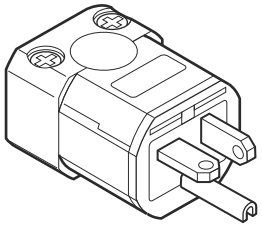
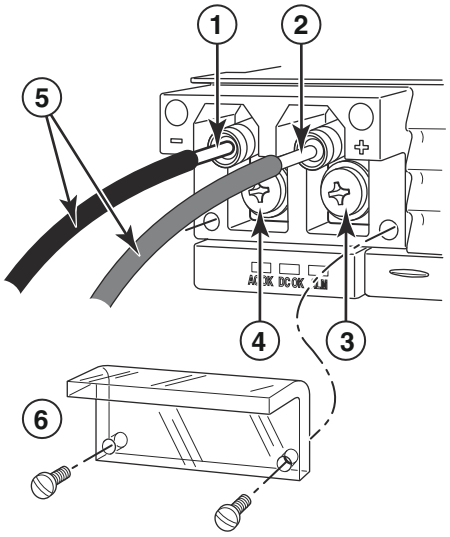


Figure 71 shows the DC connector for the SX-DCPWR-SYS and SX-DCPWR-POE power supplies.

FIGURE 71 DC power cables for SX-DCPWR-SYS and SX-DCPWR-POE power supplies Regulatory



1 -48 VDC Lead
2 48 RTN Lead
3 Positive Terminal Screw
4 Negative Terminal Screw
5 AWG Wire
6 Terminal Screw Cover

compliance

The power supplies comply with the conducted and radiated test, immunity, and safety standards as listed in Table 39. EMC standards are within a 6 dB minimum margin.

TABLE 39 Power supply regulatory compliance

Description	Certifications
Electromagnetic Emissions	CISPR 22 Class A FCC Class A VCCI Class A EN55022 Class A Harmonic Current Emissions (Class A) - EN61000-3-2, with Amendment 14 (1999) Voltage Fluctuations and Flicker - EN61000-3-3 ICES-003 Class A AS/NZS 3548 Class A

TABLE 39 Power supply regulatory compliance

Description	Certifications
Immunity	EN 55024 EN 61000-4-5. The power supply is tested to level 2 (differential mode) and level 3 (common mode)
Safety	UL 60950-1/CSA C22.2 No 60950-1-03 – Safety of Information Technology Equipment EN 60950-1 – Safety of Information Technology Equipment IEC 60950-1 – Safety of Information Technology Equipment

Safety warnings

The power supplies are marked with an electrical hazard label and with the safety warnings shown in Table 40.

TABLE 40 Safety warning labels on power supplies

CAUTION: No operator serviceable parts inside. Refer servicing to qualified personnel.	
ATTENZIONE	Non aprire. Rivolgersi a personale qualificado.
CUIDADO	Partes adentro no reparables por el operador. Refiera reparo a personal autorizado.
ATTENTION	Entretien et répartions internes ne sont autorisés qu'au personnel technique qualifié.
GEFAHR	Zugang zur Bedienung nicht erförderlich. Wartung nur durch qualifiziertes Personal.

The SX-ACPWR-SYS with part number 32014-*xxx* and SX-ACPWR-POE with part number 32016-*xxx*, have additional safety warning labels as shown in Table 41

TABLE 41 Safety warning labels on power supplies

!DANGER!: Don't touch impeller
Use caution when closing latch

Appendix

Regulatory Statements A

U.S.A.

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CAUTION

Changes or modifications made to this device which are not expressly approved by Brocade could void the user's authority to operate the equipment.

Industry Canada statement

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

English translation of above statement

This Class A digital apparatus complies with Canadian ICES-003.

Europe and Australia

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Japan VCCI statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

English translation of above statement

This is Class A product based on the standard of the Voluntary Control Council For Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Japan Denan power cord statement

注意 – 添付の電源コードを他の装置や用途に使用しない
添付の電源コードは本装置に接続し、使用することを目的として設計され、その安全性が確認されているものです。決して他の装置や用途に使用しないでください。火災や感電の原因となる恐れがあります。

English translation of above statement

ATTENTION: Never use the power cord packed with your equipment for other products.

Korea

이 기기는 A급 기기로서, 업무용으로 전자파 적합 등록을 한 기기이오니 판재자 또는 사용자는 이 점을 유의하시기 바라며, 만약 잘못 판매 또는 구입하였을 경우에는 가정용으로 교환하시기 바랍니다.

English translation of above statement

This apparatus has radio wave acceptability registration as a Class A device, so sellers or users should be aware of this. If it is sold or purchased incorrectly, it should be exchanged with a home apparatus (Class B).

Russia

Сертификат Соответствия в "Системе сертификации в области связи" № ОС-2-СПД-0560, срок действия: с 29 октября 2009 г. до 29 октября 2012 г.

English translation of above statement

Certificate of Conformity in “Certification System in the field of telecommunications” # ОС-2-СПД-0560, validity from the 29 of October 2009 to the 29 of October 2012.

Germany

For FastIron SX 1600:

Machine noise information regulation - 3. GPSGV, the highest sound pressure level value is 78.0 dB(A) in accordance with EN ISO 7779.

Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 78.0 dB(A) gemäss EN ISO 7779.

For FastIron SX 800:

Machine noise information regulation - 3. GPSGV, the highest sound pressure level value is 77.3 dB(A) in accordance with EN ISO 7779.

Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 77.3 dB(A) gemäss EN ISO 7779.

BSMI statement (Taiwan)

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，
在這種情況下，使用者會被要求採取某些適當的對策。

English translation of above statement

Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

A BSMI statement (Taiwan)

Appendix

Caution and Danger Notices

B

Cautions

The cautions and dangers notices that appear in this manual are listed below in English, German, French, and Spanish.

A caution calls your attention to a possible hazard that can damage equipment.

“Vorsicht” weist auf die Gefahr einer möglichen Beschädigung des Gerätes in.

Une mise en garde attire votre attention sur un risque possible d'endommagement de l'équipement. Ci-dessous, vous trouverez les mises en garde utilisées dans ce manuel.

Un mensaje de precaución le advierte sobre un posible peligro que pueda dañar el equipo. Las siguientes son precauciones utilizadas en este manual.

CAUTION	Do not install the device in an environment where the operating ambient temperature might exceed 40° C (104° F).
VORSICHT	Das Gerät darf nicht in einer Umgebung mit einer Umgebungsbetriebstemperatur von über 40° C (104° F) installiert werden.
MISE EN GARDE	N'installez pas le dispositif dans un environnement où la température d'exploitation ambiante risque de dépasser 40° C (104° F).
PRECAUCIÓN	No instale el instrumento en un entorno en el que la temperatura ambiente de operación pueda exceder los 40°C (104°F).

CAUTION	Remove the power cord from a power supply before you install it in or remove it from the device. Otherwise, the power supply or the device could be damaged as a result. (The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source.)
VORSICHT	Nehmen Sie vor dem Anschließen oder Abtrennen des Geräts das Stromkabel vom Netzteil ab. Ansonsten könnten das Netzteil oder das Gerät beschädigt werden. (Das Gerät kann während des Anschließens oder Annehmens des Netzteils laufen. Nur das Netzteil sollte nicht an eine Stromquelle angeschlossen sein.)
MISE EN GARDE	Enlevez le cordon d'alimentation d'un bloc d'alimentation avant de l'installer ou de l'enlever du dispositif. Sinon, le bloc d'alimentation ou le dispositif risque d'être endommagé. (Le dispositif peut être en train de fonctionner lorsque vous installez ou enlevez un bloc d'alimentation, mais le bloc d'alimentation lui-même ne doit pas être connecté à une source d'alimentation.)
PRECAUCIÓN	Retire el cordón de corriente del suministro de corriente antes de instalarlo o retírarlo del instrumento. De no hacerse así, el suministro de corriente o el instrumento podrían resultar dañados. (El instrumento puede estar encendido mientras se instala o retira un suministro de corriente, pero el suministro de corriente en sí no deberá conectado a la corriente).

CAUTION	Make sure the air flow around the front, sides, and back of the device is not restricted.
VORSICHT	Stellen Sie sicher, dass an der Vorderseite, den Seiten und an der Rückseite der Luftstrom nicht behindert wird.
MISE EN GARDE	Vérifiez que rien ne restreint la circulation d'air devant, derrière et sur les côtés du dispositif et qu'elle peut se faire librement.
PRECAUCIÓN	Asegúrese de que el flujo de aire en las inmediaciones de las partes anterior, laterales y posterior del instrumento no esté restringido.

CAUTION	Use a separate branch circuit for each AC power cord, which provides redundancy in case one of the circuits fails.
VORSICHT	Es empfiehlt sich die Installation eines separaten Stromkreiszweiges für jede Wechselstrom-Elektroschnur als Redundanz im Fall des Ausfalls eines Stromkreises.
MISE EN GARDE	Utilisez un circuit de dérivation différent pour chaque cordon d'alimentation C.A. Ainsi, il y aura un circuit redondant en cas de panne d'un des circuits.
PRECAUCIÓN	Use un circuito derivado separado para cada cordón de alimentación de CA, con lo que se proporcionará redundancia en caso de que uno de los circuitos falle.

CAUTION	Ensure that the device does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add the ampere (amp) ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the input power connectors.
VORSICHT	Stromkreise, Verdrahtung und Überlastschutz dürfen nicht durch das Gerät überbelastet werden. Addieren Sie die Nennstromleistung (in Ampere) aller Geräte, die am selben Stromkreis wie das Gerät installiert sind. Somit können Sie feststellen, ob die Gefahr einer Überbelastung der Versorgungsstromkreise vorliegt. Vergleichen Sie diese Summe mit der Nennstromgrenze des Stromkreises. Die Höchstnennströme (in Ampere) stehen normalerweise auf der Geräterückseite neben den Eingangsstromanschlüssen.
MISE EN GARDE	Assurez-vous que le dispositif ne risque pas de surcharger les circuits d'alimentation, le câblage et la protection de surintensité. Pour déterminer le risque de surcharge des circuits d'alimentation, additionnez l'intensité nominale (ampères) de tous les dispositifs installés sur le même circuit que le dispositif en question. Comparez alors ce total avec la limite de charge du circuit. L'intensité nominale maximum en ampères est généralement imprimée sur chaque dispositif près des connecteurs d'entrée d'alimentation.
PRECAUCIÓN	Verifique que el instrumento no sobrecargue los circuitos de corriente, el cableado y la protección para sobrecargas. Para determinar la posibilidad de sobrecarga en los circuitos de suministros, añada las capacidades nominales de corriente (amp) de todos los instrumentos instalados en el mismo circuito que el instrumento. Compare esta suma con el límite nominal para el circuito. Las capacidades nominales de corriente máximas están generalmente impresas en los instrumentos, cerca de los conectores de corriente de entrada.

CAUTION	All devices with DC power supplies are intended for installation in restricted access areas only. A restricted access area is where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.
VORSICHT	Alle Geräte mit DC-Netzteil sind nur für die Installation in Bereichen mit beschränktem Zugang gedacht. Ein Bereich mit beschränktem Zugang ist ein Bereich, zu dem nur Wartungspersonal mit Spezialwerkzeug, Schlüssel oder anderen Sicherheitsvorrichtungen Zugang hat. Dieser Zugang wird von für den Bereich zuständigen Personen überwacht.
MISE EN GARDE	Tous les dispositifs avec bloc d'alimentation C.C. sont conçus pour l'installation dans des zones à accès réglementé uniquement. Une zone à accès réglementé est une zone dont l'accès n'est possible qu'au personnel de service utilisant un verrou, une clé ou un outil spécial, ou d'autres moyens de sécurité, et qui est contrôlée par les autorités responsables du site.
PRECAUCIÓN	Todos los instrumentos con suministros de corriente continua han sido diseñados únicamente para instalación en áreas restringidas. Se entiende como área de acceso restringido un lugar al que solo puede acceder personal de servicio mediante el uso de una herramienta especial, llave y cerrojo u otro medio de seguridad similar, y que esté controlado por la autoridad responsable de esa ubicación.

CAUTION	Use the erase startup-config command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the write memory command to save the running configuration to the startup-config file.
VORSICHT	Verwenden Sie den Befehl "Erase startup-config" (Löschen Startup-Konfig) nur für neue Systeme. Wenn Sie diesen Befehl in ein bereits konfiguriertes System eingeben, löscht der Befehl die Konfiguration. Falls Sie aus Versehen die Konfiguration eines bereits konfigurierten Systems löschen, geben Sie den Befehl "Write Memory" (Speicher schreiben) ein, um die laufende Konfiguration in der Startup-Konfig-Datei zu speichern.
MISE EN GARDE	N'utilisez la commande erase startup-config que pour les nouveaux systèmes. Si vous entrez cette commande sur un système que vous avez déjà configuré, elle efface la configuration. Si vous effacez la configuration par accident sur un système configuré, entrez la commande write memory pour enregistrer la configuration actuelle dans le fichier startup-config.
PRECAUCIÓN	Use el comando erase startup-config (borrar configuración de inicio) para sistemas nuevos solamente. Si usted introduce este comando en un sistema que ya ha configurado, el comando borrará la configuración. Si usted borra accidentalmente la configuración en un sistema ya configurado, introduzca el comando write memory (escribir memoria) para guardar la configuración en ejecución en el archivo startup-config.

CAUTION	Never leave tools inside the chassis.
VORSICHT	Lassen Sie keine Werkzeuge im Chassis zurück.
MISE EN GARDE	Ne laissez jamais d'outils à l'intérieur du châssis.
PRECAUCIÓN	No deje nunca herramientas en el interior del chasis.

CAUTION	All devices with AC power sources are intended for installation in restricted access areas only. A restricted access area is a location where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security.
VORSICHT	Alle Geräte mit Wechselstromquellen sind nur zur Installation in Sperrbereichen bestimmt. Ein Sperrbereich ist ein Ort, zu dem nur Wartungspersonal mit einem Spezialwerkzeug, Schloss und Schlüssel oder einer anderen Schutzvorrichtung Zugang hat.
MISE EN GARDE	Tous les équipements dotés de sources d'alimentation électrique secteur sont destinés à être installés uniquement dans des zones à accès réglementé. Une zone à accès réglementé est une zone dont l'accès n'est possible qu'au personnel de service utilisant un verrou, une clé ou un outil spécial, ou d'autres moyens de sécurité.
PRECAUCIÓN	Todos aquellos dispositivos con fuentes de alimentación de CA están diseñados para su instalación en zonas de acceso restringido solamente. Una zona de acceso restringido es un lugar al que sólo puede acceder personal de mantenimiento haciendo uso de una herramienta especial, una llave y un candado, o algún otro medio de seguridad.

CAUTION	For a Brocade AC system, use a ground wire of at least 6 American Wire Gauge (AWG). The ground wire should have an agency-approved crimped connector (provided with the chassis) attached to one end, with the other end attached to building ground. The connector must be crimped with the proper tool, allowing it to be connected to both ground screws on the enclosure.
VORSICHT	Für ein Wechselstromsystem Brocade ist ein Erdleiter von mindestens 6 AWG (amerikanische Norm für Drahtquerschnitte) zu verwenden. An einem Ende des Erdleiters sollte ein geprüfter gecrimpter Anschluss (mit Chassis bereitgestellt) angebracht sein. Das andere Ende sollte an der Gebäudeerdung angeschlossen werden. Der Anschluss muss mit dem richtigen Werkzeug gecrimpt werden, so dass er an beiden Erdungsschrauben am Gehäuse angeschlossen werden kann.
MISE EN GARDE	Pour un système à alimentation secteur Brocade, utiliser un câble de mise à la terre de calibre AWG 6 (13 mm²) minimum. Ce fil de terre doit être équipé d'un côté d'un connecteur à sertir agréé (fourni avec le châssis), et l'autre extrémité doit être reliée à la terre du bâtiment. Ce connecteur doit être serti à l'aide de l'outil approprié afin d'être raccordé aux deux vis de mise à la terre du boîtier.
PRECAUCIÓN	Para un sistema de CA Brocade, utilice un conductor de tierra de al menos 6 CAE (Calibre de Alambre Estadounidense, American Wire Gauge o AWG en sus siglas en inglés). El conductor de tierra debe tener un conector rizado homologado (suministrado con el chasis) acoplado a un extremo, y el otro extremo debe estar conectado a la tierra del edificio. El conector debe rizarse con la herramienta apropiada, de manera que se conecte a los dos tornillos de tierra del recinto.

CAUTION	It is recommended that modules are disabled through the CLI before removal from the chassis. If the operator wishes to remove the module without first disabling the module, the Hot Swap capability will support this procedure on the FastIron SX 800 and FastIron SX 1600 chassis operating software Release 3.2 or later. Hot Swap should be performed during a maintenance window. On rare occasions, a Hot Swap can result in a software reload of the system. The likelihood of this event is very low.
VORSICHT	Es wird empfohlen, dass die Module vor der Entfernung aus dem Chassis über die CLI (Befehlszeilenschnittstelle) deaktiviert werden. Wenn der Bediener das Modul ohne vorherige Deaktivierung entfernen will, wird dieses Verfahren durch die Hot-Swap-Fähigkeit auf der Betriebssoftware Version 3.2 oder höher des FastIron SX 800 und FastIron SX 1600 Chassis unterstützt. Ein Hot-Swap sollte in einem Wartungszeitfenster durchgeführt werden. In seltenen Fällen kann ein Hot-Swap zu einem Software-Reload des Systems führen. Die Wahrscheinlichkeit dieses Ereignisses ist sehr gering.
MISE EN GARDE	Il est recommandé de désactiver les modules via l'interpréteur de ligne de commandes avant de les retirer du châssis. Si l'opérateur souhaite retirer un module sans le désactiver au préalable, cette procédure est possible grâce à la fonctionnalité de remplacement à chaud des châssis FastIron SX 800 et FastIron SX 1600 avec la version 3.2 ou ultérieure du logiciel. Il est conseillé de n'effectuer un remplacement à chaud que pendant une plage horaire réservée à la maintenance. En de rares occasions, un remplacement à chaud peut provoquer un redémarrage de l'équipement, bien que la probabilité soit très faible.
PRECAUCIÓN	Se recomienda inhabilitar los módulos desde la CLI antes de retirarlos del chasis. Si el operador desea desmontar el módulo sin inhabilitarlo primero, la capacidad de sustitución en caliente permitirá tal procedimiento en los chasis FastIron SX 800 y FastIron SX 1600 con software de operación de edición 3.2 o posterior. La sustitución en caliente deberá efectuarse durante un periodo de mantenimiento. Aunque sucede raras veces, la sustitución en caliente puede provocar una recarga del software del sistema. La probabilidad de que esto ocurra es muy baja.

CAUTION	If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.
VORSICHT	Falls kein Modul im Steckplatz installiert wird, muss die Steckplatztafel angebracht werden. Wenn ein Steckplatz nicht abgedeckt wird, läuft das System heiß.
MISE EN GARDE	Si vous n'installez pas de module dans un slot, vous devez laisser le panneau du slot en place. Si vous faites fonctionner le châssis avec un slot découvert, le système surchauffera.
PRECAUCIÓN	Si no instala un módulo en la ranura, deberá mantener el panel de ranuras en su lugar. Si pone en funcionamiento el chasis con una ranura descubierta, el sistema sufrirá sobrecalentamiento.

CAUTION	Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
VORSICHT	Falls dieses Gerät verändert oder modifiziert wird, ohne die ausdrückliche Genehmigung der für die Einhaltung der Anforderungen verantwortlichen Partei einzuholen, kann dem Benutzer der weitere Betrieb des Gerätes untersagt werden.
MISE EN GARDE	Les éventuelles modifications apportées à cet équipement sans avoir été expressément approuvées par la partie responsable d'en évaluer la conformité sont susceptibles d'annuler le droit de l'utilisateur à utiliser cet équipement.
PRECAUCIÓN	Si se realizan cambios o modificaciones en este dispositivo sin la autorización expresa de la parte responsable del cumplimiento de las normas, la licencia del usuario para operar este equipo puede quedar anulada.

CAUTION	The POE power supply is designed exclusively for use with the *FastIron X Series* POE devices. The power supply produces extensive power to support 802.3af applications. Installing the power supply in a device other than the *FastIron X Series* POE will cause extensive damage to your equipment.
VORSICHT	Das POE Stromnetz hat für die *FastIron X Series* POE Geräte ausschießlich aufgezeichnet. Dieses Stromnetz erzeugt umfassend Starkstrom zur Bestätigun von 802.3af Anwendungen. Ihr Anlage beschädigt wird, wenn das Stromnetz in Geräte anders als *FastIron X Series* POE einbauen wird.
MISE EN GARDE	Le bloc d'alimentation POE est conçu exclusivement pour être utilisé avec les dispositifs *FastIron X Series* POE. Le bloc d'alimentation produit une alimentation très importante pour prendre en charge les applications 802.3af. Si vous l'installez dans un dispositif autre que les *FastIron X Series* POE, il endommagera gravement votre équipement.
PRECAUCIÓN	El suministro de corriente alterna del POE está diseñado exclusivamente para uso con los dispositivos *FastIron X Series* POE. El suministro de corriente produce suficiente energía para abastecer a las aplicaciones 802.3af. Si se instala el suministro de corriente en un dispositivo que no sea el *FastIron X Series* POE, se producirán daños de consideración al equipo.

CAUTION	For the DC input circuit to the system, make sure there is a 30 amp circuit breaker, minimum -48Vdc, double pole, on the input to the terminal block. The input wiring for connection to the product should be copper wire, 8 AWG, marked VW-1, and rated minimum 90 degrees celcius.
VORSICHT	Für den Eingangs-Gleichstromkreis zum System ist ein 30 A (Minimum), -48 V DC, doppelpolig, am Eingang zur Reihenklemme zu installieren. Bei der Eingangsverdrahtung zum Anschluss des Produkts sollte es sich um einen 8 AWG-Kupferdraht (VW-1) und einer Mindestnenntemperatur von 32° handeln.
MISE EN GARDE	Pour le circuit d'alimentation C.C du système, assurez-vous de la présence d'un disjoncteur de 30 ampères, minimum –48 V C.C., double coupure, sur l'entrée vers le bloc d'alimentation. Les câbles d'alimentation pour le produit doivent être en fils de cuivre, 8 AWG (American Wire Gauge), marqués VW-1 et classés 90 degrés Celsius.
PRECAUCIÓN	Para el circuito de entrada de CC al sistema, verifique que existe un cortacircuitos catalogado de 30 amperios, como mínimo, -48 VCC, bipolar, en la entrada al bloque terminal. El cableado de entrada para la conexión al producto deberá ser de cable de cobre catalogado, 8 AWG, marcado con VW-1, y tener una capacidad nominal mínima para 90 grados centígrados.

CAUTION	For a DC system, use a grounding wire of at least 6 American Wire Gauge (AWG). The 6 AWG wire should be attached to an agency-approved crimp connector crimped with the proper tool. The crimp connector should allow for securement to both ground screws on the enclosure. For the Ground lug, use UL listed Panduit crimp connector, P/N LCD6-10A, and two 10-32, PPH, screws to secure crimp connector to chassis. Grounding position is located on the side of the chassis adjacent ground symbol.
VORSICHT	Für ein Gleichstromsystem ist ein Erdungsdraht (wenigstens 6 AWG) erforderlich. Ein 6 AWG-Draht muss mit dem richtigen Werkzeug an einen zugelassenen Crimpverbinder angebracht werden. Der Crimpverbinder dient der Sicherung beider Erdungsschrauben am Gehäuse. Benutzen Sie einen Panduit-Crimpverbinder, Teile Nr. LCD6-10A, als Erdungskabelschuh und zwei 10-32 PPH-Schrauben zum Anbringen des Crimpverbinder am das Gehäuse. Die Erdungsposition befindet sich auf der Gehäuseseite neben dem Erdungssymbol.
MISE EN GARDE	Pour les systèmes C.C., utilisez un fil de mise à la terre d'au moins 6 AWG (American Wire Gauge). Ce fil de 6 AWG doit être relié à un connecteur à sertissage homologué, serti avec l'outil approprié. Le connecteur à sertissage doit permettre la sécurisation aux deux vis de borne de terre sur le boîtier. Pour la patte de mise à la terre, utilisez un connecteur à sertissage UL Panduit, P/N LCD6-10A, et deux vis 10-32, PPH pour attacher le connecteur à sertissage au châssis. La position de mise à la terre se trouve sur le côté du châssis, près du symbole de mise à la terre.
PRECAUCIÓN	Para un sistema de CC, utilice un cable de conexión a tierra de calibre de cable norteamericano (AWG) número 6. El cable 6 AWG deberá acoplarse a un conector engarzado aprobado y engarzado con la herramienta apropiada. El conector engarzado deberá permitir el aseguramiento de ambos tornillos de conexión a tierra en el recinto. Para la lengüeta de masa, emplee un conector engarzado Panduit catalogado por UL, No de pieza LCD6-10A, y dos tornillos PPH, 10-32, para fijar el conector engarzado al chasis. La posición de la conexión a tierra está ubicada en el lado del chasis adyacente al símbolo de conexión a tierra.

CAUTION	Do not attempt to install the power supply without first releasing the latch on the front of the power supply. Attempting to install the power supply with a closed latch will result in mechanical damage to the power supply and power supply slot.
VORSICHT	Installieren Sie die Stromversorgung erst, nachdem Sie den Kippschalter vorne am Netzteil gelöst haben. Wenn Sie versuchen, das Netzteil mit einem geschlossenen Kippschalter zu installieren, werden die mechanischen Bestandteile des Netzteils und des Netzteilsteckplatzes beschädigt.
MISE EN GARDE	N'essayez pas d'installer le bloc d'alimentation sans avoir ouvert le verrou à l'avant du bloc d'alimentation. Si vous essayez d'installer le bloc d'alimentation alors que le verrou est fermé, le bloc d'alimentation et l'emplacement du bloc d'alimentation subiront des dommages mécaniques.
PRECAUCIÓN	No intente instalar el suministro de energía sin haber primero liberado el seguro en la parte frontal del suministro de energía. Si se intenta instalar el suministro de energía con el seguro cerrado se provocará un daño mecánico al suministro de energía y a la ranura del mismo.

CAUTION	Make sure the power supply is properly inserted in the slot. Never insert the power supply upside down.
VORSICHT	Das Netzteil muss ordnungsgemäß im Steckplatz installiert sein. Das Netzteil darf auf keinen Fall umgekehrt in den Steckplatz gesteckt werden.
MISE EN GARDE	Assurez-vous que le bloc d'alimentation est correctement inséré dans l'emplacement. N'insérez jamais le bloc d'alimentation à l'envers.
PRECAUCIÓN	Verifique que el suministro de energía esté bien insertado en la ranura. No inserte nunca el suministro de energía en posición invertida.

CAUTION	If your device does not have dual management modules, do not remove the management module.
VORSICHT	Wenn Ihr Gerät nicht mit Dual-Management-Modulen ausgestattet ist, darf das Management-Modul nicht entfernt werden.
MISE EN GARDE	Si l'appareil n'est pas doté de modules de gestion redondants, ne pas retirer l'unique module de gestion en place.
PRECAUCIÓN	Si su dispositivo no dispone de módulos de administración dobles, no quite el módulo de administración.

CAUTION	The FSX 1600 chassis is extremely heavy. Always use two or more people to lift and slide the chassis into the rack.
VORSICHT	Das FSX 1600-Chassis ist sehr schwer. Das Chassis muss immer von mindestens zwei Personen angehoben und in das Rack geschoben werden.
MISE EN GARDE	Le châssis du FSX 1600 est extrêmement lourd. Deux personnes ou plus sont nécessaires pour soulever le châssis et le faire glisser dans le rack.
PRECAUCIÓN	El chasis FSX 1600 es extremadamente pesado. Levántelo con la ayuda de por lo menos otra persona y deslícelo en el interior del armazón

CAUTION	A fully loaded FXS chassis is extremely heavy. For this reason, Brocade recommends that you install the empty FSX 1600 chassis in the rack before you install the modules.
VORSICHT	Ein voll beladenes FSX-Chassis ist sehr schwer. Aus diesem Grund empfiehlt Brocade, dass Sie das unbeladene FSX 1600-Chassis im Rack installieren, bevor Sie die Module installieren.
MISE EN GARDE	Un châssis FSX entièrement équipé est extrêmement lourd. C'est pourquoi Brocade recommande d'installer d'abord le châssis vide du FSX 1600 dans le rack, puis d'y installer les modules.
PRECAUCIÓN	Un chasis FSX completamente cargado es extremadamente pesado. Por este motivo, Brocade recomienda la instalación del chasis FSX 1600 vacío en el armazón antes de instalar los módulos.

CAUTION	Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
VORSICHT	Falls dieses Gerät verändert oder modifiziert wird, ohne die ausdrückliche Genehmigung der für die Einhaltung der Anforderungen verantwortlichen Partei einzuholen, kann dem Benutzer der weitere Betrieb des Gerätes untersagt werden.
MISE EN GARDE	Les éventuelles modifications apportées à cet équipement sans avoir été expressément approuvées par la partie responsable d'en évaluer la conformité sont susceptibles d'annuler le droit de l'utilisateur à utiliser cet équipement.
PRECAUCIÓN	Si se realizan cambios o modificaciones en este dispositivo sin la autorización expresa de la parte responsable del cumplimiento de las normas, la licencia del usuario para operar este equipo puede quedar anulada.

Dangers

A danger notice calls your attention to a possible hazard that can cause injury or death. The following are the dangers used in this manual.

"Gefahr" weist auf eine mögliche Gefährdung hin, die zu Verletzungen oder Tod führen können. Sie finden die folgenden Warnhinweise in diesem Handbuch.

Un danger attire votre attention sur un risque possible de blessure ou de décès. Ci-dessous, vous trouverez les dangers utilisés dans ce manuel.

Una advertencia le llama la atención sobre cualquier peligro posible que pueda ocasionar daños personales o la muerte. A continuación se dan las advertencias utilizadas en este manual.

DANGER	The procedures in this manual are for qualified service personnel.
GEFAHR	Die Verfahren in diesem Handbuch sind nur für qualifiziertes Wartungspersonal gedacht.
DANGER	Les procédures décrites dans ce manuel doivent être effectuées par le personnel de service qualifié uniquement.
PELIGRO	Los procedimientos de este manual se han hecho para personal de servicio cualificado.

DANGER	All fiber optic interfaces use Class 1 lasers.
GEFAHR	Alle Glasfaser-Schnittstellen verwenden Laser der Klasse 1.
DANGER	Toutes les interfaces en fibres optiques utilisent des lasers de classe 1.
PELIGRO	Todas las interfaces de fibra óptica utilizan láser de clase 1.

DANGER	Make sure the rack or cabinet housing the device is adequately secured to prevent it from becoming unstable or falling over.
GEFAHR	Stellen Sie sicher, dass das Gestell oder der Schrank für die Unterbringung des Geräts auf angemessene Weise gesichert ist, so dass das Gestell oder der Schrank nicht wackeln oder umfallen kann.
DANGER	Vérifiez que le bâti ou le support abritant le dispositif est bien fixé afin qu'il ne devienne pas instable ou qu'il ne risque pas de tomber.
PELIGRO	Verifique que el bastidor o armario que alberga el instrumento está asegurado correctamente para evitar que pueda hacerse inestable o que caiga.

DANGER	Mount the devices you install in a rack or cabinet as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.
GEFAHR	Montieren Sie die Geräte im Gestell oder Schrank so tief wie möglich. Platzieren Sie das schwerste Gerät ganz unten, während leichtere Geräte je nach Gewicht (je schwerer desto tiefer) darüber untergebracht werden.
DANGER	Montez les dispositifs que vous installez dans un bâti ou support aussi bas que possible. Placez le dispositif le plus lourd en bas et le plus léger en haut, en plaçant tous les dispositifs progressivement de bas en haut du plus lourd au plus léger.
PELIGRO	Monte los instrumentos que instale en un bastidor o armario lo más bajos posible. Ponga el instrumento más pesado en la parte inferior y los instrumentos progresivamente más livianos más arriba.

DANGER	Disconnect the power cord from all power sources to completely remove power from the device.
GEFAHR	Ziehen Sie das Stromkabel aus allen Stromquellen, um sicherzustellen, dass dem Gerät kein Strom zugeführt wird.
DANGER	Débranchez le cordon d'alimentation de toutes les sources d'alimentation pour couper complètement l'alimentation du dispositif.
PELIGRO	Para desconectar completamente la corriente del instrumento, desconecte el cordón de corriente de todas las fuentes de corriente.

DANGER	Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.
GEFAHR	Stellen Sie sicher, dass die Stromkreise ordnungsgemäß geerdet sind. Benutzen Sie dann das mit dem Gerät gelieferte Stromkabel, um es an die Srromquelle anzuschließen.
DANGER	Vérifiez que les circuits de sources d'alimentation sont bien mis à la terre, puis utilisez le cordon d'alimentation fourni avec le dispositif pour le connecter à la source d'alimentation.
PELIGRO	Verifique que circuitos de la fuente de corriente están conectados a tierra correctamente; luego use el cordón de potencia suministrado con el instrumento para conectarlo a la fuente de corriente.

DANGER	If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.
GEFAHR	Falls für die Installation ein anderes Stromkabel erforderlich ist (wenn das mit dem Gerät gelieferte Kabel nicht passt), müssen Sie sicherstellen, dass Sie ein Stromkabel mit dem Siegel einer Sicherheitsbehörde verwenden, die für die Zertifizierung von Stromkabeln in Ihrem Land zuständig ist. Das Siegel ist Ihre Garantie, dass das Stromkabel sicher mit Ihrem Gerät verwendet werden kann.
DANGER	Si l'installation nécessite un cordon d'alimentation autre que celui fourni avec le dispositif, assurez-vous d'utiliser un cordon d'alimentation portant la marque de l'organisation responsable de la sécurité qui définit les normes et régulations pour les cordons d'alimentation dans votre pays. Cette marque vous assure que vous pouvez utiliser le cordon d'alimentation avec le dispositif en toute sécurité.
PELIGRO	Si la instalación requiere un cordón de corriente distinto al que se ha suministrado con el instrumento, verifique que usa un cordón de corriente que venga con la marca de la agencia de seguridad que defina las regulaciones para cordones de corriente en su país. Esta marca será su garantía de que el cordón de corriente puede ser utilizado con seguridad con el instrumento.

DANGER	Power supplies are hot swappable, which means they can be removed and replaced while the chassis is powered on and running. However, Brocade recommends that you disconnect the power supply from the wall outlet before removing and replacing the supply. The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the power supply or other parts of the device could be damaged.
GEFAHR	Netzteile können unter Strom stehend ausgetauscht werden. Allerdings empfiehlt Brocade, dass Sie das Netzteil vom Netzstrom abtrennen, bevor Sie das Netzteil anschließen oder abtrennen. Das Gerät kann während des Anschließens oder Abnehmens des Netzteils laufen. Nur das Netzteil sollte nicht an eine Stromquelle angeschlossen sein. Ansonsten können Sie verletzt oder das Netzteil bzw. andere Geräteteile beschädigt werden.
DANGER	Les blocs d'alimentation peuvent être changés à chaud. Cependant, Brocade vous conseille de débrancher le bloc d'alimentation de l'alimentation C.A. avant d'installer ou d'enlever le bloc d'alimentation. Le dispositif peut être en cours de fonctionnement pendant que vous installez ou enlevez un bloc d'alimentation, mais le bloc d'alimentation lui-même ne doit pas être connecté à une source d'alimentation. Sinon, vous risquez d'être blessé ou le bloc d'alimentation ou d'autres pièces du dispositif risquent d'être endommagés.
PELIGRO	Los suministros de corriente pueden intercambiarse sin necesidad de ajustes. No obstante, Brocade recomienda que desconecte el suministro de corriente de la toma de corriente alterna antes de instalar o retirar el suministro. El instrumento puede estar activado cuando se esté instalando o retirando un suministro de corriente, pero el suministro de corriente en sí no deberá estar conectado a la fuente de corriente. De no hacerlo así, podría sufrir daños personales o el suministro de corriente u otras piezas podrían resultar dañadas.

DANGER	Before beginning the installation, refer to the precautions in "Determining which power supply failed" on page 122.
GEFAHR	Vor der Installation siehe Vorsichtsmaßnahmen unter " Power Precautions " (Vorsichtsmaßnahmen in Bezug auf elektrische Ablagen) auf den Seiten 7-18.
DANGER	Avant de commencer l'installation, consultez les précautions décrites dans " Power Precautions " (Précautions quant à l'alimentation), pages 7-18.
PELIGRO	Antes de comenzar la instalación, consulte las precauciones en la sección " Power Precautions" (Precauciones sobre corriente) que se encuentra en las páginas 7-18.

DANGER	For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.
GEFAHR	Aus Sicherheitsgründen sollte ein EGB-Armband zum Schutz von elektronischen gefährdeten Bauelementen mit einem 1 Megaohm-Reihenwiderstand ausgestattet sein.
DANGER	Pour des raisons de sécurité, la dragonne ESD doit contenir une résistance de série 1 méga ohm.
PELIGRO	Por razones de seguridad, la correa de muñeca ESD deberá contener un resistor en serie de 1 mega ohmio.

DANGER	A fully populated chassis is heavy. TWO OR MORE PEOPLE ARE REQUIRED WHEN LIFTING, HANDLING, OR MOUNTING THESE DEVICES.
GEFAHR	Ein voll bestücktes Gehäuse ist schwer. ZUM ANHEBEN, HANDHABEN ODER MONTIEREN DIESER GERÄTE SIND MINDESTENS ZWEI PERSONEN ERFORDERLICH.
DANGER	Les châssis sont lourds quand ils sont entièrement remplis. POUR SOULEVER, MANIPULER OU MONTER CES DISPOSITIFS, DEUX PERSONNES MINIMUM SONT NÉCESSAIRES.
PELIGRO	Un chasis muy concurrido es muy pesado. SE REQUIEREN DOS O MÁS PERSONAS CUANDO SE VAYA A ALZAR, MANEJAR O MONTAR ESTE DISPOSITIVO.

DANGER	Be careful not to accidently insert your fingers into the fan tray while removing it from the chassis. The fan may still be spinning at a high speed.
GEFAHR	Die Finger dürfen nicht versehentlich in das Ventilatorblech gesteckt werden, wenn dieses vom Gehäuse abgenommen wird. Der Ventilator kann sich unter Umständen noch mit hoher Geschwindigkeit drehen.
DANGER	Faites attention de ne pas accidentellement insérer vos doigts dans le boîtier du ventilateur lorsque vous l'enlevez du châssis. Il est possible que le ventilateur tourne encore à grande vitesse.
PELIGRO	Procure no insertar los dedos accidentalmente en la bandeja del ventilador cuando esté desmontando el chasis. El ventilador podría estar girando a gran velocidad.

DANGER	Make sure to choose the appropriate circuit device depending on the number of AC power supplies installed in the chassis. The minimum current draw for the system is one AC power supply.
GEFAHR	Je nach Anzahl der Wechselstrom-Netzteile im Gehäuse muss das passende Stromgerät ausgewählt werden. Für die Mindeststromentnahme für das System ist ein Wechselstrom-Netzteil erforderlich.
DANGER	Assurez-vous de choisir le dispositif de circuit approprié selon le nombre de blocs d'alimentation C.A. installés dans le châssis. L'appel de courant minimum pour le système est d'un bloc d'alimentation C.A.
PELIGRO	Verifique que elige el instrumento para circuitos apropiado dependiendo del número de suministros de energía de CC instalados en el chasis. La llamada de corriente mínima para el sistema es de un suministro de energía de CC.

DANGER	High Touch Current. Earth connection essential before connecting supply.
GEFAHR	Hoher Ableitstrom. Vor Anschluss ans Netz Schutzerdung herstellen.
DANGER	Courant de fuite élevé. Mise à la terre obligatoire avant la connexion de l'alimentation.
PELIGRO	Alta tensión al tacto. La conexión a tierra es esencial antes de conectar la alimentación.

B Dangers